Institut de la statistique du Québec

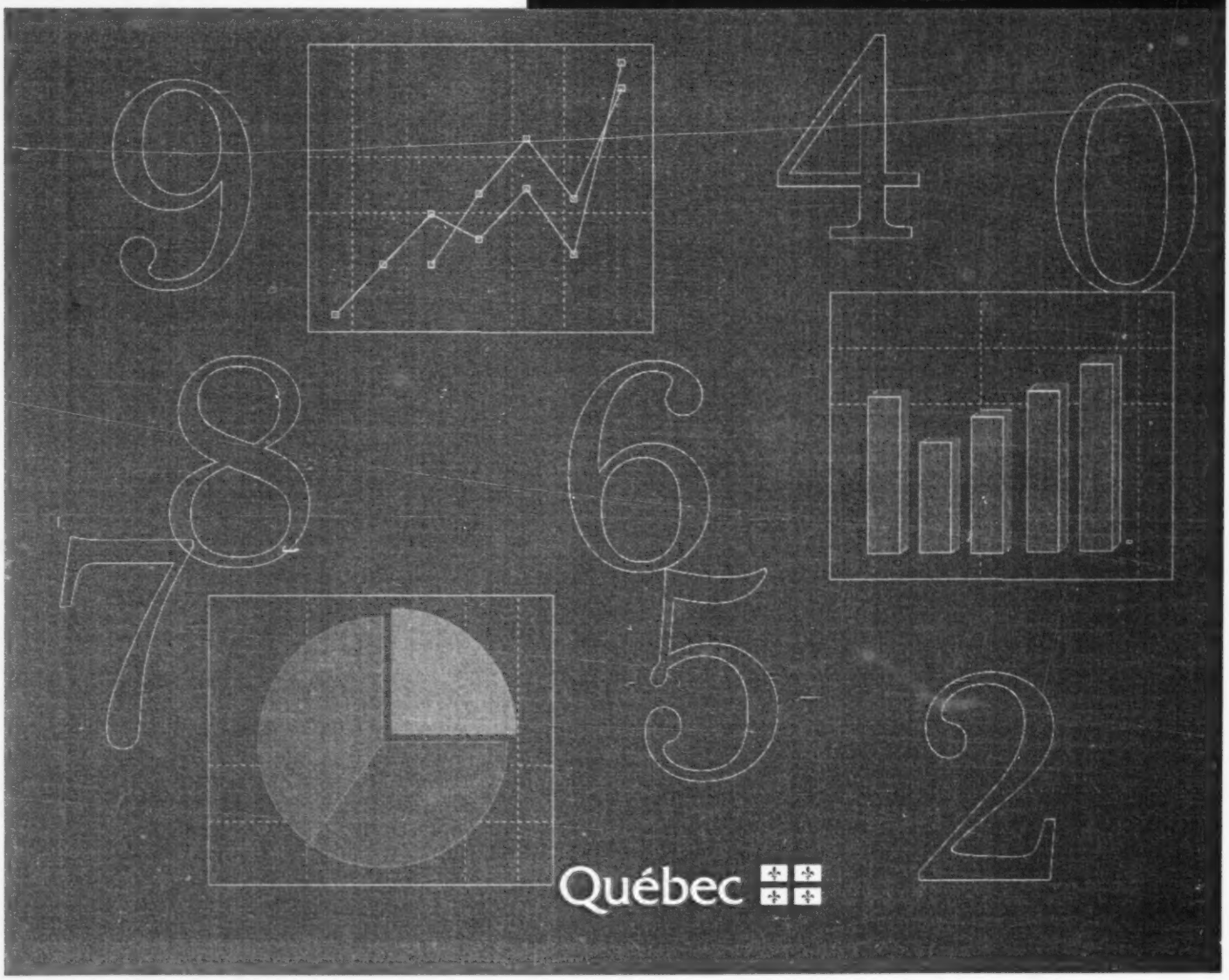
LONGITUDINAL STUDY OF CHILD DEVELOPMENT IN QUÉBEC (ÉLDEQ 1998-2002)

5-MONTH-OLD INFANTS

Diet

Volume 1, Number 5

COLLECTION
Health and Well-Being



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May 2000

Forward

Similar to what has been observed in the majority of industrialized nations over the past twenty years, Québec and Canada have seen a significant increase in the costs related to maladjustment, particularly in young people. The Longitudinal Study of Child Development in Québec (*l'Étude longitudinale du développement des enfants du Québec*) (ÉLDEQ 1998-2002) being conducted by *Santé Québec* (Health Québec),[1] a division of *l'Institut de la statistique du Québec (ISQ)*[2] (Québec Institute of Statistics) in collaboration with a group of university researchers, will provide an indispensable tool for action and prevention on the part of government, professionals and practitioners in the field, who every day must face maladjustment in children.

More precisely, a major purpose of this longitudinal study of a cohort of newborns is to give Québec a means of preventing extremely costly human and social problems, such as school dropout, delinquency, suicide, drug addiction, domestic violence, etc. Similar to what is being done elsewhere (in the UK, New Zealand, the US), *Santé Québec* and a group of researchers have designed and developed a longitudinal study of children 0 to 5 years of age (2,223 children in this study and 600 twins in a related one). It will help gain a better understanding of the factors influencing child development and psychosocial adjustment.

The general goal of ÉLDEQ 1998-2002 is to learn the PRECURSORS, PATHS and EFFECTS, over the medium and long terms, of children's adjustment to school. ÉLDEQ is the logical extension of the National Longitudinal Study of Children and Youth (NLSCY, Canada). These Québec and Canada-wide longitudinal studies are both comparable and complementary. They employ distinct survey methods, and use different techniques to obtain the initial samples. Though many of the instruments are practically identical, about a third of those being used in ÉLDEQ are not the same.

This first report casts light on the enormous potential of the data generated by this study. From the descriptive analyses of the results of the first year of the study to the longitudinal analyses of subsequent years, there will be an enormous wealth of data. With updated knowledge on the development of the cohort of young children, the annual longitudinal follow-up will respond to the needs which the *ministère de la Santé et des Services Sociaux du Québec - MSSS* (Ministry of Health and Social Services), who financed the data collection, expressed in both the Report of the Working Group on Youth (*Rapport Bouchard, 1991, Un Québec fou de ses enfants* - the Bouchard Report, 1991, A Québec in Love with its Children) and the policy papers entitled *Politique de la santé et du bien-être, 1992* (Health and Well-Being) and *les Priorités nationales de santé publique 1997-2002* (Public Health Priorities 1997-2002).

Director General

Yvon Fortin

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1. Certain French appellations in italics in the text do not have official English translations. The first time one of these appears, the unofficial English translation is shown immediately after it. Following this, for ease in reading, only the official French name appears in the text in italics, and it is suggested the reader refer to the Glossary for the English translation.

2. *Santé Québec* officially became a division of the *ISQ* on April 1, 1999.

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This analytical paper is also available in French. Ce numéro et aussi disponible en version française sous le titre « L'alimentation » dans *Étude longitudinale du développement des enfants du Québec (ÉLDEQ 1998-2002)*, Québec, Institut de la statistique du Québec, vol. 1, no. 5].

Caution:

Unless indicated otherwise, "n" in the tables represents data weighted to the size of the initial sample.

Because the data were rounded off, totals do not necessarily correspond to the sum of the parts.

Unless explicitly stated otherwise, all the differences presented in this report are statistically significant to a confidence level of 95%.

To facilitate readability, proportions higher than 5% were rounded off to the nearest whole unit in the text, and to the nearest decimal in the tables and figures.

Weighting and the complex sample design were taken into account in calculating the results and their precision. The precision of the estimates of proportions was calculated using a mean design effect. This was also used for the chi-square tests, except in questionable cases for which the SUDAAN software program was used. In all other analyses, SUDAAN was used. Basic hypotheses, such as the normality of the data, were verified before applying the selected statistical tests.

Symbols

... Not applicable (N/A)
.. Data not available
-- Nil or zero
p < Refers to the threshold of significance

Abbreviations

CV	Coefficient of variation
Not avail.	Not available
not signif.	Not significant

Acknowledgments

Santé Québec recognizes that the development and implementation of the Longitudinal Study of Child Development in Québec (ÉLDEQ 1998-2002) flows directly from the synergy of effort and professionalism of many people throughout the whole process of mounting a survey of this size. Since 1995, individuals, various groups and organizations, a survey firm and the staff of *Santé Québec* have become indispensable links in making this ambitious project a reality - the first annual longitudinal survey of Québec infants.

A major characteristic of this project is that a pretest and survey are conducted every year. To accomplish this, we must annually: 1) make two sets of instruments (pretest and survey), 2) conduct two data collections, 3) analyze two sets of data, and 4) produce two types of communications materials. The results of each pretest means fine-tuning and developing instruments for the survey, which follows 17 months later. The results are sent to the parents (highlights), published in reports, and communicated to the scientific community and the public at large. The professionals and staff involved in collecting the data, as well as those involved before and after, must put their nose to the grindstone every year. We cannot over-emphasize our profound recognition of the incredible, concerted effort they are putting into this project over an 8-YEAR period, from the first pretest in 1996 to the final report to be published in 2004!

First, it must be said that without Daniel Tremblay, Director of *Santé Québec* (now part of the *ISQ*) since 1994, Christine Colin, Assistant Deputy Minister responsible for Public Health 1993-1998, Aline Émond, Director of *Santé Québec* 1986-1993, Richard E. Tremblay, Director of the ÉLDEQ research project, and Marc Renaud, President of *le Conseil québécois de la recherche sociale - CQRS* 1991-1997. ÉLDEQ 1998-2002, also known as "In 2002... I'll Be 5 Years Old!," would have never seen the light of day. In turn and together, they developed, defended and obtained the financing for this study. Thank you for your indefatigable tenacity.

A warm thanks to all the researchers and the support staff of their respective research groups, whose determination over the years has never wavered. Putting their research grants together every year has contributed to the development of the instruments, analysis of the data and publication of the copious results.

I would like to thank Lyne Des Groseilliers, ÉLDEQ's statistician since 1996, Robert Courtemanche, statistical advisor, and France Lapointe, ÉLDEQ's statistician 1995-1996. These three colleagues in the *Direction de la méthodologie et des enquêtes spéciales* (Methodology and Special Surveys Division) *(ISQ)* managed, with great skill, to set the signposts and navigate the somewhat winding course of this large-scale survey first.

A very special thanks to all the master designers of the National Longitudinal Study of Children and Youth (NLSCY, Canada). Without their expertise, advice and generosity, our survey would never have been accomplished. In many senses of the word "modeling," ÉLDEQ has learnt a lot from the NLSCY.

We would also like to extend out gratitude to the staff of the *Groupe de recherche sur l'inadaptation psychosociale chez l'enfant - GRIP* (Research Unit on Children's Pyschosocial Maladjustment) at the University of Montréal. Without their expertise, some of our survey instruments would have never been computerized to such a high level of quality.

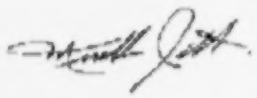
We would like to thank the personnel in the *Service de support aux opérations de la Régie de l'assurance-maladie du Québec - RAMQ* (Operations Support Section of the Québec Health Insurance Board). Without their efficiency, fewer letters of introduction would have found their way to the correct addresses of respondents.

Our sincerest thanks go to our survey firm, *Bureau d'interviewers professionnels (BIP)*. Since 1996, this polling company has been responsible for data collection in the pretests and surveys, and follow-up of families both inside and outside of Québec. Lucie Leclerc, President of *BIP*, has set the standard of quality for our numerous and complex data collections. Assisted by Véronique Dorison, she has instilled in her interviewers a great sense of respect for the respondent families, as well as a rigourous regard for all the norms governing this first-of-a-kind survey in Québec.

A big thank-you to the directors-general, directors of professional services, and staff of the medical records departments of some 80 hospitals in the province who accepted to collaborate in our study at a time when resources were rare and time was at a premium, and when the medical records departments in many hospitals were merging or in the process of doing so. Their support was exceptional. Birthing centres also graciously accepted to participate in this first Québec longitudinal study of children. A special thanks to Julie Martineau, medical records specialist, who contributed to the analysis of indispensable medical information by ensuring very rigourous coding of the data, which often lay concealed in the medical files of the infants and their mothers.

It goes without saying that the staff of *Santé Québec* Division directly attached to ÉLDEQ 1998-2002 are the cornerstone of its success from practically every point of view. Special thanks for their ongoing contribution and constant hard work go to Hélène Desrosiers and Josette Thibault, responsible respectively for analysis of the data and creation of the measurement instruments; Martin Boivin, Rolland Gaudet and Gérald Benoît, who constantly pushed the limits of what computer software can do in terms of programming and data processing; Suzanne Bernier-Messier and Diane Lord, who give meaning to the word versatility, who must organize, code and manage incredible quantities of data to ensure the progress of the study. Not directly attached to the team but who made extremely important contributions are: France Lacoursière, France Lozeau and Thérèse Cloutier, who put the finishing touches to the *Santé Québec* "look" in the survey instruments, reports and conference publications; Lise Ménard-Godin, who conducted fruitful literature searches and advised on many aspects of the collection instruments. The hard work, constant availability, ability to adapt, and finely-honed skills of the people working on this project match the enthusiasm that all our partners have demonstrated in making this study a resounding success.

Finally, I would like to extend a very special thank-you to the 2,223 families who responded to our survey. Thank you for the trust you have shown in *Santé Québec*, our partners and collaborators. Thanks to your participation, your children have become the veritable stars of ÉLDEQ 1998-2002, and are making it possible, in the short term, to gain a better understanding of psychosocial adjustment in children. In the medium and long terms, they will likely be in large part responsible for the establishment of early detection programs, better designed prevention programs, and more effective interventions for such an important clientele - all of Québec's children.



Mireille Jetté
Project Coordinator
Santé Québec Division, ISQ

Preventing Social Maladjustment

It suffices to consider the costs engendered by behavioural problems in children - school dropout, delinquency, alcoholism, drug addiction, family violence, mental disorders and suicide - to conclude that they largely surpass what a modern society can accept, morally and economically. Faced with the enormity of these problems, the first reflex is to provide services to these people which will, ideally, make the problems disappear, or at the very least, lessen their severity. For many years we have tried to offer quality services to children and adults who suffer from antisocial disorders, alcoholism, drug addiction, depression, and physical or sexual abuse. However, in spite of enormous investment, these curative services are far from being able to respond to the demand.

Although the idea of early intervention as a preventive measure can be traced at least as far back as ancient Greece, the second half of the 20th century will certainly be recognized as the dawn of the field of social maladjustment prevention (Coie *et al.*, 1993; Mrazek & Haggerty, 1994). Numerous programs have been developed for adolescents and teenagers to prevent school dropout, delinquency, drug addiction and suicide. Scientific evaluations of these programs have been far too few in number, but they tend to demonstrate that it is extremely difficult to help those most at risk in this age group (Rosenbaum & Hanson, 1998; Rutter, Giller & Hagell, 1998; Tremblay & Craig, 1995). It is becoming increasingly clear that the factors which lead to serious adaptation problems are in place long before adolescence. Hence the idea that the prevention of social adaptation problems should start at least during childhood, and preferably right from pregnancy (Olds *et al.*, 1998; Tremblay, LeMarquand & Vitaro, 1999). These principles are clearly outlined in the objectives of the *Politique de la santé et du bien-être* (Policy on Health and Well-Being) and *les Priorités nationales de santé publique* (Priorities for Public Health) set by the government of Québec (ministère de la Santé et des Services sociaux, 1992; 1997).

The Need to Understand Early Childhood Development

If the field of maladjustment prevention appeared at the end of the 20th century, it has certainly come on the heels of child development. "*Émile,*" by Jean-Jacques Rousseau, needs to be re-read in light of recent studies to realize just to what degree it is impossible to understand the complexity of child development, and therefore the means of preventing deviant paths, simply by reflection or introspection. Although considerable knowledge has been acquired in the neurological, motor, cognitive, affective and social development of children, what really hits home is that Jean-Jacques Rousseau and his followers in education seemed to have had more certainty about the ways of educating children than we do today.

Progress in child development research has made us realize that things are not as simple as we can or would like to imagine. We have obviously all been children, and most of us have become parents, indeed, relatively well-adjusted ones. But we still do not clearly understand when, how and why adjustment problems appear, and above all, how to prevent and correct them.

Our ignorance is obvious when we examine the debates among specialists on the role of parents in the development of maladjustment problems in children. Some suggest that social maladjustment in children is largely determined by genetic factors (Bock & Goode, 1996; Rowe, 1994). Some accentuate economic factors (Duncan & Brooks-Gunn, 1997). Other researchers attribute a determining role to peer influence (Harris, 1998; Harris, 1995; Vitaro *et al.*, 1997). These larger questions lead to narrower ones which focus on particular aspects - the role of fathers in childhood maladjustment, the impact of alcohol and cigarette consumption during pregnancy, the effect of prenatal and birthing problems, the importance of breast feeding and diet, the role of sleep, cognitive development, temperament, and so on.

The majority of these questions are at the heart of the daily concerns of parents, grandparents, educators, family service providers, and legislators. What can we do to maximize the development of our children, to prevent severe psychosocial maladjustment? What should we do when problems begin to appear, when pregnant mothers, or fathers themselves have

a long history of disorders? The answers to these questions obviously have an effect on the policies put forth by Québec government Ministries such as *ministères de la Famille et de l'Enfance* (Family and Child Welfare), *de l'Éducation* (Education), *de la Santé et des Services sociaux*, *de la Solidarité sociale* (Social Solidarity - formerly Income Security (Welfare)), *de la Sécurité publique* (Public Security), *de la Justice* (Justice), and *le ministère de la Recherche, Science et Technologie* (Research, Science and Technology).

The Contribution of ÉLDEQ 1998-2002

The Longitudinal Study of Child Development in Québec (ÉLDEQ 1998-2002) was conceived in order to contribute to our knowledge of the development of children in their first 5 years of life. The main goal is to gain a better understanding of the factors, in the years of rapid growth, which lead to success or failure upon entry into the school system. The goal of the second phase (if approved) is to better understand development in elementary school, in light of development in early childhood.

We know that this survey cannot be a definitive one on child development in Québec, but it is the first representative study of a provincial cohort of children who will be measured annually from birth to entry into the school system. It specifically aims at understanding the development of basic skills needed for educational success.

Although the effort to set up this study began in 1989, the first data collection coincided with the Québec government's implementation of its *Politique Familiale* (Policy on Families). The policy has virtually the same objectives as our study:

> "These services for children 5 years and under should give all Québec children, whatever the socioeconomic status of their parents, the chance to acquire and develop the skills that will allow them to succeed in school (1997, p. 10)."

On March 3 1999, in the speech opening the 36th session of the Québec legislature, Premier Lucien Bouchard confirmed that early childhood development was a priority for the government:

> "The theme that will dominate our actions this year, next year, and throughout our mandate, is youth... The priority...with regards to youth in Québec, begins with the family and childhood... This massive investment in early childhood... will give our children the best chance of success in the short, medium and long terms. It is our best asset against alienation and despair. It is our best preparation for personal, social and economic success."

Because of this historic coincidence, ÉLDEQ has the potential of becoming an invaluable tool for monitoring the effects of Québec's massive investment in early childhood which began in 1997. Thanks to the data collected by the federal government's National Longitudinal Study of Children and Youth (NLSCY, Canada), we will be able to compare child development in Québec with that elsewhere in Canada, before and after the implementation of Québec's new policy on the family.

However, our initial objectives are more modest. The 12 or 13 papers in this series present the results of our first annual data collection. They describe the characteristics of the families and children when the latter were 5 months old.[3] They cover sociodemographic characteristics, nature of the birthing process, health and social adaptation of the parents, family and couple relations, parent-infant relations, and characteristics of the 5-month-old, such as sleep, diet, oral hygiene, temperament, and motor, cognitive and social development. These data will eventually be compared to those on children the same age collected by the NLSCY in 1994 and 1996.

An Interdisciplinary, Multi-University Team of Researchers

This study saw the light of day because of the collaboration of many people. In the preceding pages, Mireille Jetté thanked a number of them. I would like to take advantage of this introduction to emphasize that the survey was set up and continues forward because of the dedication and hard work of a group of researchers from a variety of disciplines and universities. I would particularly like to thank Michel Boivin, School of Psychology at Laval University, and Mark Zoccolillo, Department of Psychiatry at McGill University,

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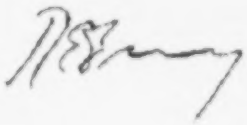
3. To simplify the text in this report, the phrase "5-month-old infants" will be used to refer to infants whose mean age was 5 months during data collection in 1998. In section 3.1.3 (Volume 1, Number 1), we explain why the infants were not all exactly the same age. As indicated in no. 2 of this series, 52% of the infants were less than 5 months, and 3.4% were 6 months of age or over.

who have been actively involved in this project since 1992. It was in that year that we prepared out first grant application for the Social Sciences and Humanities Research Council of Canada. A second group of researchers joined the team in 1993 and 1994: Ronald G. Barr, pediatrician, Montréal Children's Hospital Research Institute, McGill University; Lise Dubois, dietitian and sociologist, Laval University; Nicole Marcil-Gratton, demographer, University of Montréal and Daniel Pérusse, anthropologist, University of Montréal. Jacques Montplaisir, Department of Psychiatry, University of Montréal, joined the team in 1995. Louise Séguin, Department of Social and Preventive Medicine, University of Montréal and Ginette Veilleux, *Direction de la santé publique de la Régie régionale de la santé et des services sociaux de Montréal-Centre* (Public Health Department, Montréal-Centre Regional Health Board), joined in 1998. Three post-doctoral researchers have also made an important contribution. Raymond Baillargeon developed the task for measuring cognitive development. Christa Japel is the assistant to the scientific director for planning, analysis and presentation of the results. Heather Juby collaborates in the analysis of the data on couple and family history.

A Unique Confluence of Circumstances

A study such as this requires the coordination of many researchers over many years, enormous financial resources, and a long period of preparation. Though in the early 1990s the research team was convinced of the need for the survey, those responsible for the public purse had also to be convinced. We must therefore acknowledge the happy confluence of circumstances that allowed the players to take advantage of the opportunity at hand. When a number of civil servants in the *ministère de la Santé et des Services sociaux* understood the essential role of prevention, the creation of a committee on children and youth in 1991 led to an increased awareness of the importance of early childhood. At the same time, the president of the *CQRS*, Marc Renaud, had come to the same realization with his colleagues in the Population Health Program at the Canadian Institute for Advanced Research (CIAR). Aline Émond, the Director of *Santé Québec*, was ready to apply her formidable determination to work for the cause. For their part, Health Minister Jean Rochon and his Assistant Deputy Minister for Public Health, Christine Colin, aware of the importance and benefit of longitudinal studies on early childhood development, authorized the investment of large sums of money during a period of draconian budget cuts. This occurred at the same time as the federal government decided to create its own longitudinal study of children and youth (NLSCY). It is in this context that ÉLDEQ 1998-2002 materialized. Our survey also came to fruition because Mireille Jetté did everything in her power to make the researchers' dreams a reality, and Daniel Tremblay gave her all the support she needed by making various resources available for the project.



Richard E. Tremblay, Ph.D., M.S.R.C.
Chair of Child Development
University of Montréal

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Review of the Methodology

This analytical paper is one of a series presenting cross-sectional data collected on a large sample of 5-month-old infants surveyed in 1998. It reports on the first of 5 annual data collections on 2,120 children in Québec who will be studied until they are 5 years old. In the first year of data collection, the results on 2,223 infants were retained.[4]

The target population of the survey is Québec babies, singleton births only,[5] who were 59 or 60 weeks of gestational age[6] at the beginning of each data collection period, born to mothers residing in Québec, excluding those living in the Northern Québec, Cree, and Inuit regions, and on Indian reserves, and those for whom the duration of pregnancy was unknown. Due to variations in the duration of pregnancy and the 4 or 5 weeks allotted for each data collection wave, the infants were not all exactly the same age (gestational or chronological) at the time of the survey. Therefore, the children in Year 1 (1998) of the survey had a mean gestational age of 61 weeks - about 5 chronological months.

The survey had a stratified, three-stage sampling design, with a mean design effect for the proportions estimated at 1.3. To infer the sample data to the target population, each respondent was given a weight corresponding to the number of people he/she "represented" in the population. ÉLDEQ 1998 comprised eight main collection instruments which obtained data from the person who was closest to the baby (called the Person Most Knowledgeable - PMK), the spouse (married or common-law), the infant and the absent biological parent, if applicable. Given variation in the response rates to each instrument, three series of weights had to be calculated to ensure inferences to the population were accurate. Except for the Self-Administered Questionnaire for the Absent Father (SAQFABS) and a series of questions in the Computerized Questionnaire Completed by the Interviewer (CQCI) on absent fathers - the overall or partial response rates of which were too high - the results of all the instruments could be weighted. Therefore, the data presented here have all weighted to reduce the biases.

All data that had coefficients of variation (CV) 15% or higher are shown with one or two asterisks to clearly indicate the variability of the estimate concerned. In addition, if the partial non-response rate was higher then 5%, there is a note specifying for which sub-group of the population the estimate is less accurate.

Similar to any cross-sectional population study, the Year 1 part (5-month-old infants) of ÉLDEQ 1998-2002 has certain limits. However, the vast majority of the results are valid and accurate, and provide a particularly detailed portrait, for the first time, of 5-month-old infants in Québec.

Note to the reader: For more details on the methods, see Volume 1, Number 1 in the present series. Detailed information on the sources and justification of the instruments used in Year 1 of ÉLDEQ 1998-2002, and the design of the scales and indices used in this paper, are covered in Number 12, entitled "Concepts, Definitions and Operational Aspects."

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4. Though the results for 2,223 children were retained for the first year of data collection, 2,120 will be retained for the rest of the longitudinal study; the extra 103 were part of an over-sample used to measure the effects of the January 1998 ice storm.

5. Twins (twins births) and other multiple births were not targeted by the survey.

6. Gestational age is defined as the sum of the duration of gestation (pregnancy) and the age of the baby.

1. Introduction

The *Politique de la santé et du bien-être*, Québec's policy paper on health and well-being, recognized the importance of a good diet for health from birth onward. A healthy diet improves resistance to stress and infections and their consequences. Moreover, in case of illness, it facilitates the return to normal health (*ministère de la Santé et des Services sociaux*, 1992). The benefits of a healthy diet throughout the growth cycle of children have become increasingly documented (*Société canadienne de pédiatrie* - Canadian Paediatric Society *et al.*, 1998). The analyses of cross-sectional data and eventually the longitudinal data of ÉLDEQ will deepen our understanding of children's diets as it relates to various aspects of their development - physical, cognitive, psychomotor - in the context of the Québec population.

The first year of the longitudinal study provided data on the dietary patterns of Québec babies. First, these patterns comprise the infant feeding practices, namely breast feeding, commercial infant formula, or cow's milk; second, the introduction of complementary foods to the diet; and third, the use of certain vitamin and mineral supplements (Vitamin D, iron).

Analyses of the data provided the prevalences of total and exclusive breast feeding at various ages, namely at birth, 1 week, 1 month, 2 months, 3 months and 4 months, as well as the duration of breast feeding. These variables were then examined in association with certain characteristics of the baby's birth (prematurity, birth weight) as well as weight gain since birth (ratio of current weight to birth weight) and sleep habits (sleeping through the night or not at the time of the survey). Breast feeding practices were also analyzed according to certain characteristics of the mother (age, education, immigrant status, perception of her health status, depression status, smoking status) and family (birth order of the infant, type of family, employment situation of the parents, main source of household income and household income).

The survey explored various elements which constitute important factors to consider in interventions promoting breast feeding, namely certain aspects related to the decision to breast feed such as when the decision was made, the reasons behind the decision, and the perception of the mother about the attitude of her family (spouse/partner, mother's mother, family, etc.) and other persons towards breast feeding. These were then examined according to certain characteristics of the mother and the child, as well as variables related to the infant feeding practices. The reasons why the mother may have ceased to breast feed were also examined in relation to the duration of breast feeding. Then the transition to fruit juice and solid foods was studied, namely the issue of early introduction of complementary foods to the infant's diet. This was studied according to the infant feeding practices and certain characteristics of the mother and the infant. Finally, the use of vitamin or mineral supplements was examined as a function of breast feeding.

The associations were mainly analyzed using chi-square tests and tests of differences in proportions.[7] The tests for trends were conducted using the Cochran-Armitage Method (Fleiss, 1981). It should be noted that data on the infants' diets were drawn from the Paper Questionnaire Completed by the Interviewer (PQCI), and sociodemographic and physiological data from the Computerized Questionnaire Completed by the Interviewer (CQCI). These two questionnaires were addressed to the person who knew the infant best (Person Most Knowledgeable - PMK), who in over 99% of cases, was the biological mother of the infant.[8]

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7. The thresholds of significance in this paper were obtained using a mean design effect. As indicated in Number 1 in this series of papers, for borderline cases, an exact test was conducted to take into account the complex sample design.

8. Since virtually all the PMKs were the mothers, the feminine gender will be used to describe them in this paper.

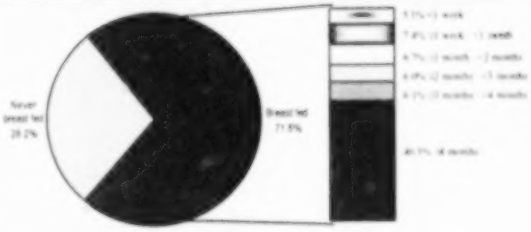
2.1 Prevalence and Duration of Breast Feeding

Breast feeding remains the recommended feeding method at the beginning of life. It results in better protection against infections and prevents allergies in babies with a family predisposition. In addition, breast feeding may prevent sudden infant death syndrome, improve the cognitive development of the child, and contribute to the development of the mother/child relationship (*Société canadienne de pédiatrie et al.*, 1998). ÉLDEQ 1998-2002 is the first large-scale study providing an estimate of the prevalence of breast feeding in Québec. The data also provide an important baseline for studying trends in children's diet in future years. Moreover, they will help contribute to the development of interventions in public health programs.

Three definitions of breast feeding were used in this study. Total breastfeeding designates the group of infants who were breast fed, whether or not they were fed other types of liquid or solid foods. Exclusive breast feeding with or without solids describes infants who were breast fed without receiving infant formula or cow's milk, but who may have been given other liquids (water, juice) and/or solid foods in their diet. Exclusive breast feeding designates only those infants who were given no other liquid or solid foods.[9] These three definitions differentiated the infant feeding practices of the Québec's mothers, namely those who breast fed without caring about exclusivity, those who breast fed while taking care not to give any substitute for breast milk but gave other liquids and solids, and those who fed the infant breast milk exclusively.

The results of Year 1 of ÉLDEQ showed that nearly three quarters (72%) of Québec infants were being breast fed at birth in 1998 (Figure 2.1). This proportion approaches the *Priorités nationales de santé publique 1997-2002* (Public Health Priorities 1997-2002) (*ministère de la Santé et des Services sociaux*, 1997) which aims to have 80% of mothers breast feeding after giving birth in a hospital. These results also coincide with those of the National Longitudinal Study of Children and Youth (NLSCY, Canada), which showed that 75% of Canadian children under 2 years of age were breast fed for at least a certain period of time in 1996 (*Développement des ressources humaines Canada & Statistique Canada* - Human Resources Development Canada & Statistics Canada, 1996). The second report on the health of the Canadian population underlines that there are no international data that allow for comparisons with breast feeding habits in Canada (*Comité Consultatif féderal-provincial-territorial sur la santé de la population* - Federal-Provincial-Territorial Consultative Committee on the Health of the Population, 1999).

Figure 2.1
Prevalence and Duration of Breast Feeding, 1998



Source: *Institut de la statistique du Québec. ÉLDEQ 1998-2002.*

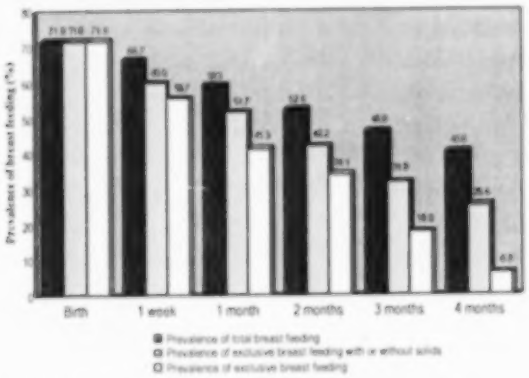
It should be emphasized that 28% of Québec infants were not being breast fed, 5% had been breast fed for less than a week, 7% for a week to less than a month, 19% for a month to less than 4 months and 41% for at least four months. At the time of the survey, slightly more than a third (34%) of the infants, who were on average 5 months of age, were still being breast fed, and half of them were drinking no other type of milk or substitute, which constituted 17% of all Québec infants at that age (data not shown).

Figure 2.2 illustrates the prevalence of breast feeding at various ages - birth, 1 week, 1 month, 2 months, 3 months and 4 months - by the three breast feeding types. Although 41% of Québec infants were breast fed for at least 4 months, only 6% were done so exclusively for the same period, whereas the recommendations of

9. UNICEF recommends not using bottles (including water) or pacifiers when exclusively breast feeding. Moreover, an expert committee composed of the Canadian Paediatric Society, Health Canada and the Dietitians of Canada (*Société canadienne de pédiatrie et al.*, 1998) advises mothers who do not want to compromise their lactation not to give the baby a bottle containing infant formula, cow's milk or water, or pacifiers in the first 2 to 4 weeks. The data on pacifier usage were not available before the writing of this paper.

the *Société canadienne de pédiatrie et al.* (1998) suggest exclusive breast feeding for at least the first 4 months of life.[10]

Figure 2.2
Prevalence of Total Breast Feeding, Exclusive Breast Feeding With or Without Solids, and Exclusive Breast Feeding, at Various Ages, 1998



Source: *Institut de la statistique du Québec. ÉLDEQ 1998-2002.*

There was a significant gap between the objectives of the *Priorités nationales de santé publique 1997-2002* (*ministère de la Santé et des Services sociaux*, 1997) - namely a prevalence of breast feeding of 60% at the age of 3 months - and the results of ÉLDEQ 1998, which showed a prevalence of 47% at 3 months. It is not possible to comment on the objective of a prevalence of 30% at the age of 6 months since only 3.4% of the infants had attained this age by the time of the survey (52% were between 4 and 5 months and 45% were 5 months of age). The prevalence of breast feeding at the age of 6 months will be retrospectively measured in the second phase of the survey.

Furthermore, Figure 2.2 indicates that by the end of the first week after birth, the prevalence of total breast feeding fell by 5% (from 72% to 67%), whereas that of exclusive breast feeding fell by 16% (from 72% to 56%). It is thus important to provide good support to mothers right from the beginning to prolong the duration of breast feeding. This gap between total breast feeding and exclusive breast feeding gradually increased as the months went by. It was the same for the gap between exclusive breast feeding with or without solids and exclusive breast feeding, a gap which became wider at 3 months, which was the mean age at which the infants began to eat solid foods (see further in the text).

When babies received a complement or substitute for breast milk, it was generally (in 99% of cases) infant formula, which in 69% of cases, was fortified with iron. The data showed that 10% of the infants had already received cow's milk by the age of 5 months (7% of breast fed babies and 18% of babies not being breast fed; $p < 0.001$; data not shown), although this is not recommended before the age of 9 months (*Société canadienne de pédiatrie et al.*, 1998).

2.2 Certain Factors Associated with Breast Feeding

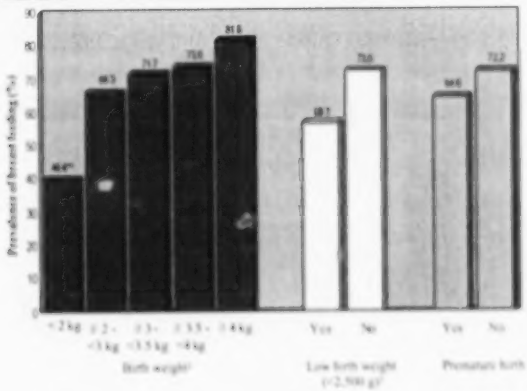
ÉLDEQ 1998 provided data to identify various factors related to the prevalence and duration of breast feeding in Québec infants. The analyses focused mainly on associations between variables related to the mother or infant and the infant's diet, then those between diverse variables reflecting the social and family environment and the infant's diet. Statistically significant associations between the variables studied and the three types of breast feeding (total, exclusive with or without solids, and exclusive) were generally similar and this, for all ages examined. For this reason, only total breastfeeding is presented here, while issues of interest for the two other types of breast feeding are highlighted where warranted by the results.

2.2.1 Birth and Infant Characteristics

Some of the characteristics of the infant's birth influenced the prevalence of breast feeding, as shown in Figure 2.3.

10. It should be underlined that including water would have produced higher prevalences of exclusive breast feeding, namely 59% at 1 week, 50% at 1 month, 40% at 2 months, 24% at 3 months and 9% at 4 months. In fact, 45% of the infants had received water by the age of one month, 65% at 2 months, 82% at 3 months and 94% at 4 months.

Figure 2.3
Prevalence of Breast Feeding at Birth, by Certain Characteristics of Child's Birth, 1998



1. $p < 0.001$.
2. $p < 0.05$.

** Coefficient of variation (CV) higher than 25%, imprecise estimate for descriptive purposes only.

Source: *Institut de la statistique du Québec, ÉLDEQ, 1998-2002.*

It seems that the higher the birth weight, the greater the prevalence of breast feeding.[11] The prevalence for infants weighing 4 kg or more at birth (82%) was more than double that for infants weighing under 2 kg (40%). It is possible that these mothers, conscious of the importance of a healthy diet during pregnancy, which would have fostered greater weight gain *in utero*, chose to breast feed their infant in greater numbers. Similarly, babies weighing less than 2,500 grams at birth (4.3% of infants) were less likely to be breast fed at birth compared to those who weighed 2,500 grams or more (57% vs. 73%). Birth weight, however, did not influence the duration of breast feeding (data not shown). Prematurity (6% of infants) was not associated with breast feeding in this survey (Figure 2.3).

There was a negative association between weight gain since birth and breast feeding (Table 2.1). A lower ratio of current weight to birth weight indicates lower weight gain since birth; 36% of infants being breast fed at 4 months had a weight gain ratio less than 2 and 16% had a ratio equal to or greater than 2.5 at the time of the survey. In comparison, 28% of babies not being breast fed at 4 months presented a ratio less than 2, whereas for 21% of them, it was equal to or higher than 2.5.

Table 2.1
Ratio of Current Weight to Birth Weight, by Whether the Infants Were Being Breast Fed or Not at Various Ages, 1998

	Ratio			Total	χ^2
	lower than 2	from 2 to under 2.5	of 2.5 and higher		
	%				
Breast fed at birth	33.9	48.5	17.6	100.0	$p < 0.001$
Not breast fed at birth	24.7	51.7	23.6	100.0	
Breast fed at 1 month	34.8	48.0	17.2	100.0	$p < 0.001$
Not breast fed at 1 month	26.2	51.5	22.3	100.0	
Breast fed at 2 months	34.8	48.4	16.8	100.0	$p < 0.01$
Not breast fed at 2 months	27.5	50.5	21.9	100.0	
Breast fed at 3 months	35.3	48.6	16.1	100.0	$p < 0.01$
Not breast fed at 3 months	28.5	50.0	21.6	100.0	
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This association between breast feeding and weight gain in children has been observed in various developed countries (Dewey *et al.*, 1992; Oski, 1993; Yoneyama *et al.*, 1994). However, it has not been possible to determine the impact of slower growth in breast fed babies, compared to the model of development observed in formula-fed babies (Grummer-Strawn, 1993; Oski, 1994). Nevertheless, it has been suggested that growth curves (used by doctors) should be re-examined based on the physical development of breast fed babies to prevent interpreting such results as indicating a growth delay in breast fed infants (Dewey *et al.*, 1992; Oski, 1993; Yoneyama *et al.*, 1994). The longitudinal data of ÉLDEQ 1998-2002 will help deepen our understanding of the inter-relationships among breast feeding, weight gain and various aspects of child development.

Figure 2.4 reveals that breast feeding, in particular its duration, was associated with whether the infant was sleeping through the night at the age of 5 months. The results show that 13% of infants not being breast fed were not sleeping through the night at that age.

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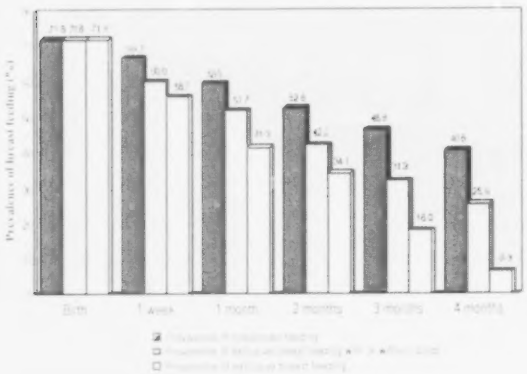

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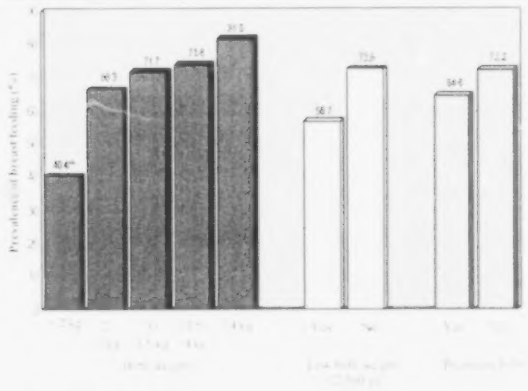

1. $p < 0.001$
2. $p < 0.05$
** Coefficient of variation (CV) higher than 25%: imprecise estimate for descriptive purposes only

Source: *Institut de la statistique du Québec, ELDEQ 1998-2002*

It seems that the higher the birth weight, the greater the prevalence of breast feeding.[11] The prevalence for infants weighing 4 kg or more at birth (82%) was more than double that for infants weighing under 2 kg (40%). It is possible that these mothers, conscious of the importance of a healthy diet during pregnancy, which would have fostered greater weight gain in utero, chose to breast feed their infant in greater numbers. Similarly, babies weighing less than 2,500 grams at birth (4.3% of infants) were less likely to be breast fed at birth compared to those who weighed 2,500 grams or more (57% vs. 73%). Birth weight, however, did not influence the duration of breast feeding (data not shown). Prematurity (6% of infants) was not associated with breast feeding in this survey (Figure 2.3).

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Figure 2.4 reveals that breast feeding, in particular its duration, was associated with whether the infant was sleeping through the night at the age of 5 months. The results show that 13% of infants not being breast fed were not sleeping through the night at that age.

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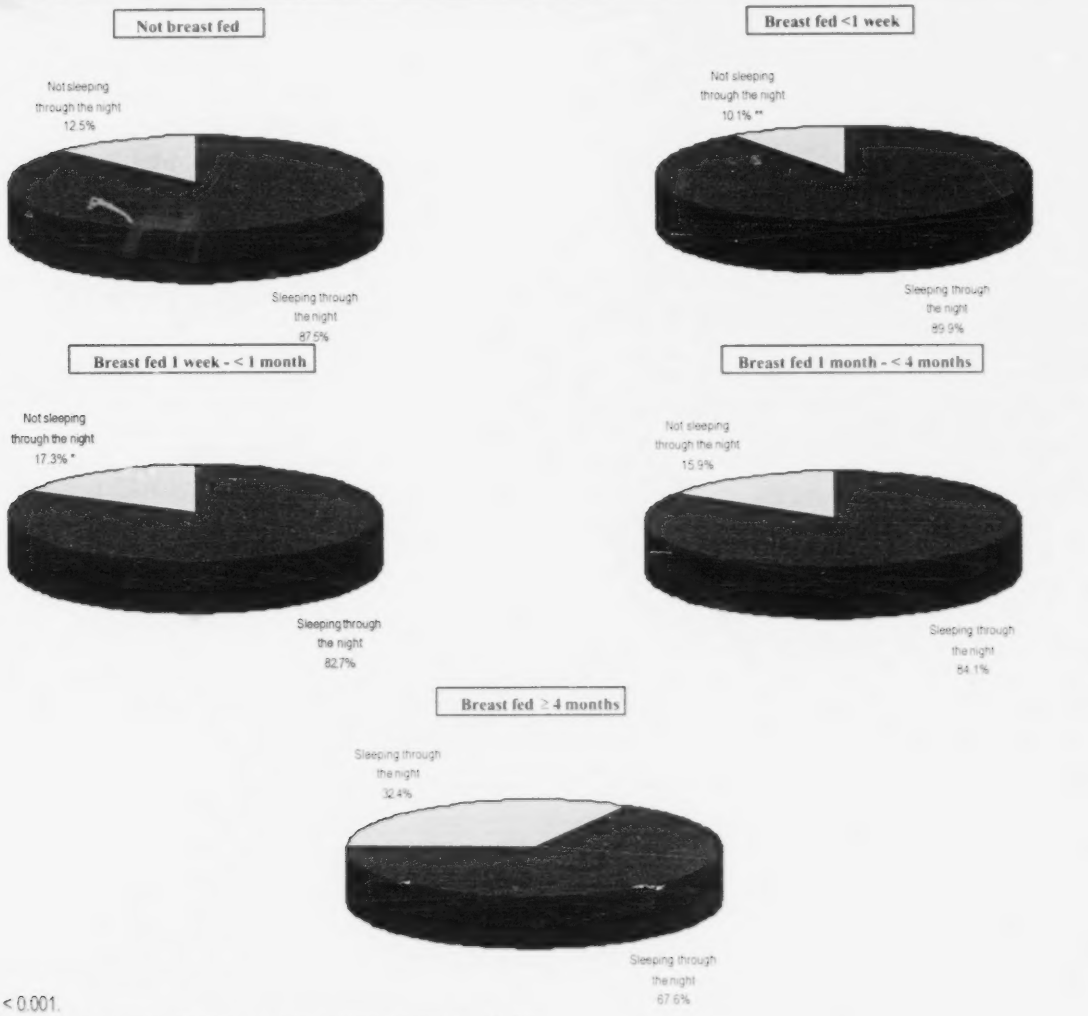
whereas this proportion was 32% for babies who had been breast fed for 4 months or more. The same association was observed for all types of breast feeding ($p < 0.001$) (data not shown). Quillin (1997) reported observing that babies who are breast fed have shorter periods of sleep at night compared to those who are not breast fed. It was not possible to determine whether breast feeding influenced the sleep patterns of the ÉLDEQ infants or if the sleep patterns influenced the duration of breast feeding. However, studies indicate that certain techniques can help mothers who breast feed to prolong their baby's night sleep (Pinilla & Birch, 1993).

Figure 2.4
Proportion of Infants Sleeping Through the Night at 5 Months, by Duration of Total Breast Feeding, 1998


Not breast fed
Not sleeping through the night 12.5%
Sleeping through the night 87.5%
Breast fed <1 week
Not sleeping through the night 10.1% **
Sleeping through the night 89.9%
Breast fed 1 week - < 1 month
Not sleeping through the night 17.3% *
Sleeping through the night 82.7%
Breast fed 1 month - < 4 months
Not sleeping through the night 15.9%
Sleeping through the night 84.1%
Breast fed ≥ 4 months
Sleeping through the night 32.4%
Sleeping through the night 67.6%

$p < 0.001$.

* Coefficient of variation (CV) between 15% and 25%; interpret with caution.

** Coefficient of variation (CV) higher than 25%; imprecise estimate for descriptive purposes only.

Source: *Institut de la statistique du Québec, ÉLDEQ 1998-2002.*

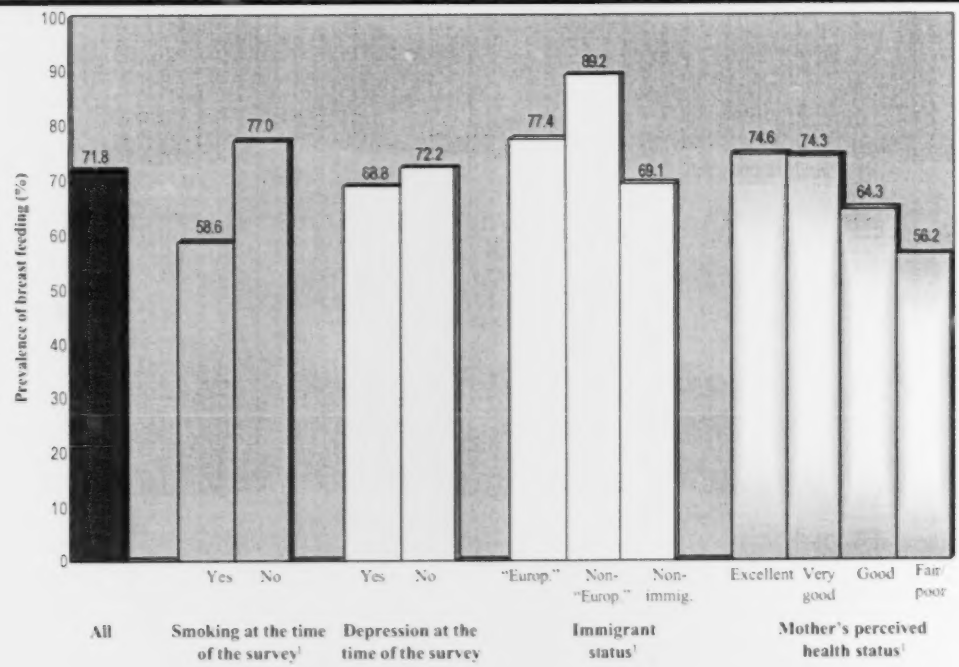
2.2.2 Characteristics of the Mother

Various characteristics of the mother were associated with breast feeding, as shown in Figures 2.5 and 2.6.

The results show that the prevalence of breast feeding at birth and at 4 months was positively associated with a better health status as perceived by the mother. This was observed for all types of breast feeding at all ages ($p < 0.05$), except for exclusive breast feeding at 4 months (data not shown).

Being a non-"European" immigrant rather than a "European" immigrant or non-immigrant was also associated with a higher prevalence of breast feeding at birth (89% vs. 77% and 69%), while at 4 months, only mothers born in Canada differed from other mothers by their significantly lower propensity to breast feed their baby (37% vs. 56% or higher) (Figures 2.5 and 2.6). However, it should be emphasized that the low numbers in these analyses do not allow for differentiation of the behaviours and attitudes related to breast feeding as a function of the great diversity of ethnocultural communities living in Québec.

Figure 2.5
Prevalence of Breast Feeding at Birth, by Certain Characteristics of the Mother, 1998



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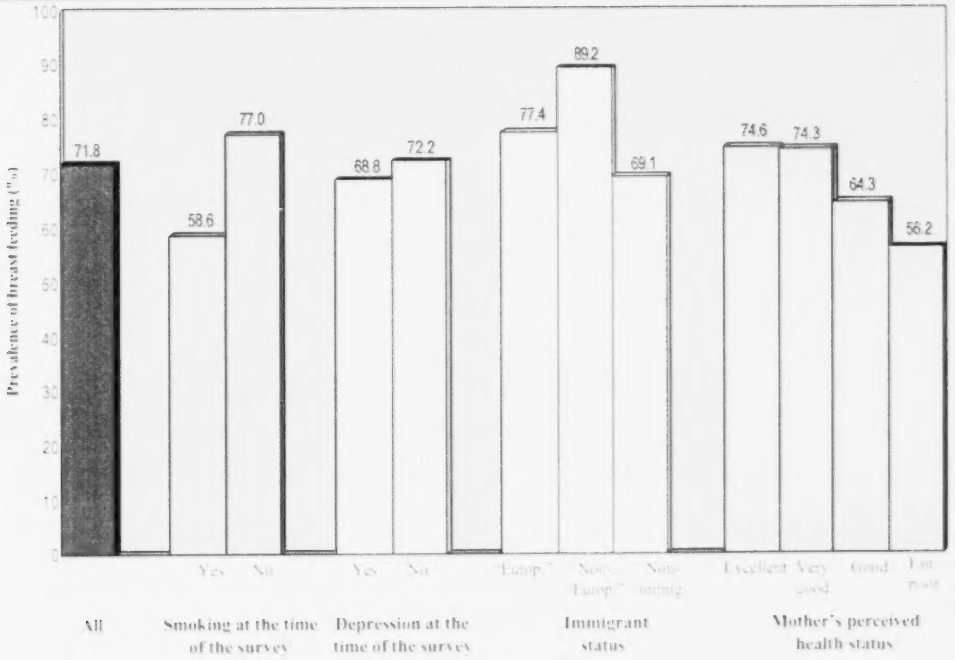
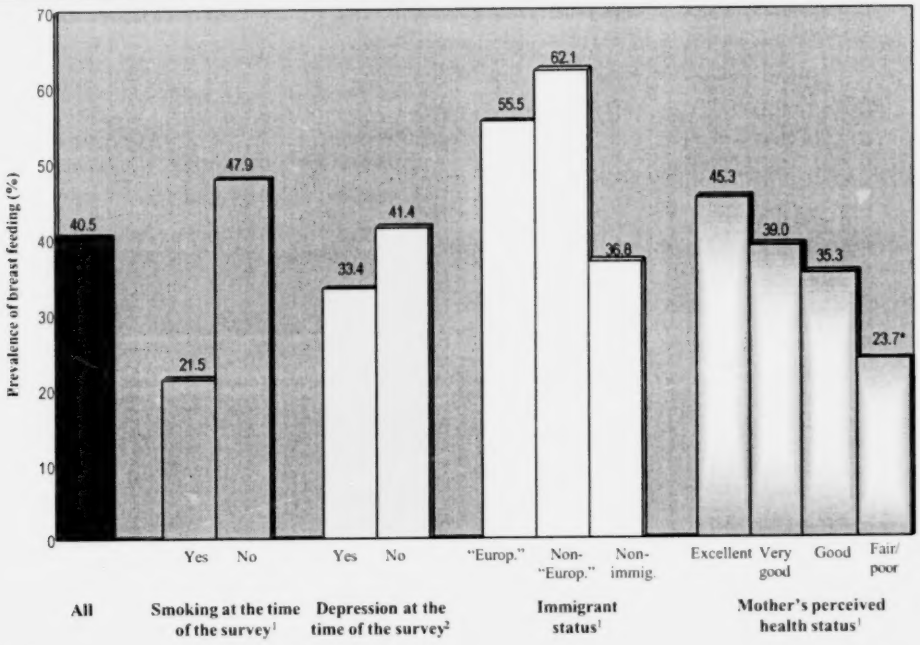


1. $p < 0.001$

Source: *Institut de la statistique du Québec, ELDEQ 1998-2002*

Figure 2.6
Prevalence of Total Breast Feeding at 4 Months, by Certain Characteristics of the Mother, 1998



1. $p < 0.001$.
2. $p < 0.05$.

* Coefficient of variation (CV) between 15% and 25%, interpret with caution..

Source: *Institut de la statistique du Québec, ÉLDEQ 1998-2002.*

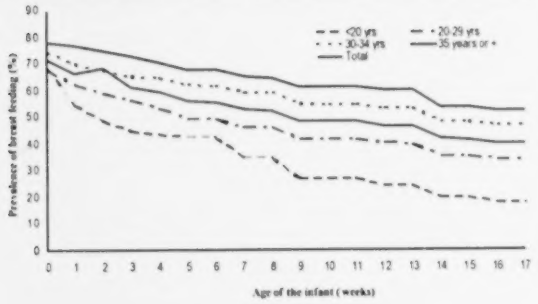
It seems that depression (symptoms) at the time of the survey[12] was not associated with the prevalence of breast feeding at birth, but was inversely associated with its prevalence at 4 months. The same was observed for total breast feeding at 2 months and 3 months ($p < 0.05$), and for exclusive breast feeding at 1 week, at 1 month and 2 months ($p < 0.01$) (data not shown). Smoking at the time of the survey, for the mother, was associated with a lower prevalence of breast feeding (Figures 2.5 and 2.6). The same was observed for all ages studied and for all types of breast feeding ($p < 0.001$) (data not shown). The same associations were also observed for mothers who had smoked during pregnancy (data not shown). The survey revealed similar proportions for mothers who had smoked and those who had not smoked during pregnancy (25% vs. 75%) and at the time of the survey (28% vs. 72%). It can be surmised that this involved the majority of the same mothers, and that they had also smoked during the first months of the infant's life. The results showed that 58% of mothers who had smoked during pregnancy had breast fed their baby at birth compared to 77% of non-smoking mothers (data not shown).

Figure 2. 7 shows the positive association between the age of the mother and the prevalence of total breast feeding at various ages (in weeks) of the infant. As reported by *l'Enquête nationale sur la santé de la population 1996-1997* (National Survey of the Health of the Population 1996-1997) (Comité consultatif fédéral-provincial-territorial sur la santé de la population, 1999), the gap between the prevalence of breast feeding in teenage mothers compared to the other mothers seemed to widen as the infant aged. The same kind

12. This variable was based on the results of an abbreviated version of the CES-D Depression Scale used in ÉLDEQ. A result of 13 or higher on the scale indicated that the mother showed symptoms of moderate or severe depression (for more details, see No. 12 in this series of analytical papers).

of association was observed for each type of breast feeding studied (data not shown).

Figure 2.7
Prevalence of Total Breast Feeding at Various Ages, by Age Group of the Mother at the Time of the Survey, 1998[1]

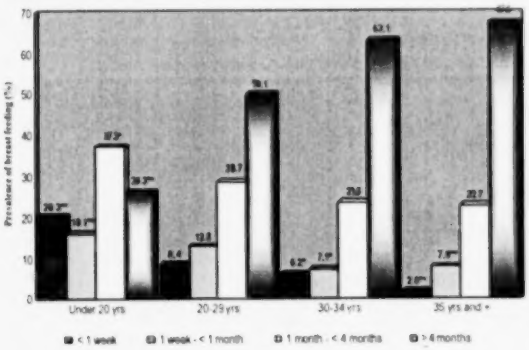


1. The curves end at 17 weeks (approximately 4 months), namely the age attained by the youngest infants in the survey.

Source: *Institut de la statistique du Québec, ÉLDEQ 1998-2002.*

To complement the preceding data, Figure 2.8 presents the association between the age of the mother and the duration of breast feeding for infants who had been breast fed or continued to be. Infants with younger mothers were less likely than those with mothers in the other age groups to be breast fed for 4 months or longer. This suggests it is important to provide good support for young mothers who choose to breast feed, since they have a tendency to abandon it earlier than older mothers. The association tended to be gradual from one age group to another. It should be noted that differences in the duration of breast feeding between younger mothers (under 30 yrs) and older ones (30 yrs and over) seemed to increase when the infant went from 2 months to 3 months of age (data not shown).

Figure 2.8
Duration of Total Breast Feeding, by Age Group of the Mother at the Time of the Survey, 1998[1]



1. $p < 0.001$.

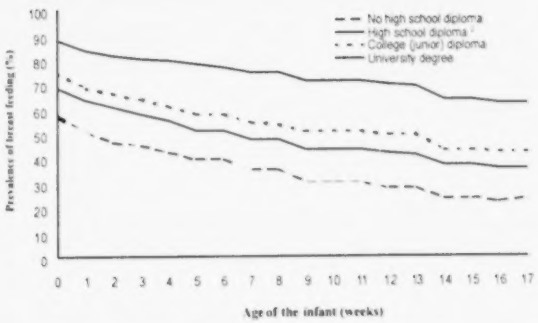
* Coefficient of variation (CV) between 15% and 25%; interpret with caution.

** Coefficient of variation (CV) higher than 25%; imprecise estimate for descriptive purposes only.

Source: *Institut de la statistique du Québec, ÉLDEQ 1998-2002.*

Similarly, educational level of the mother was positively associated with prevalences of total breast feeding at various ages (Figure 2.9).

Figure 2.9
Prevalence of Total Breast Feeding at Various Ages, by Educational Level of the Mother at the Time of the Survey, 1998[1]

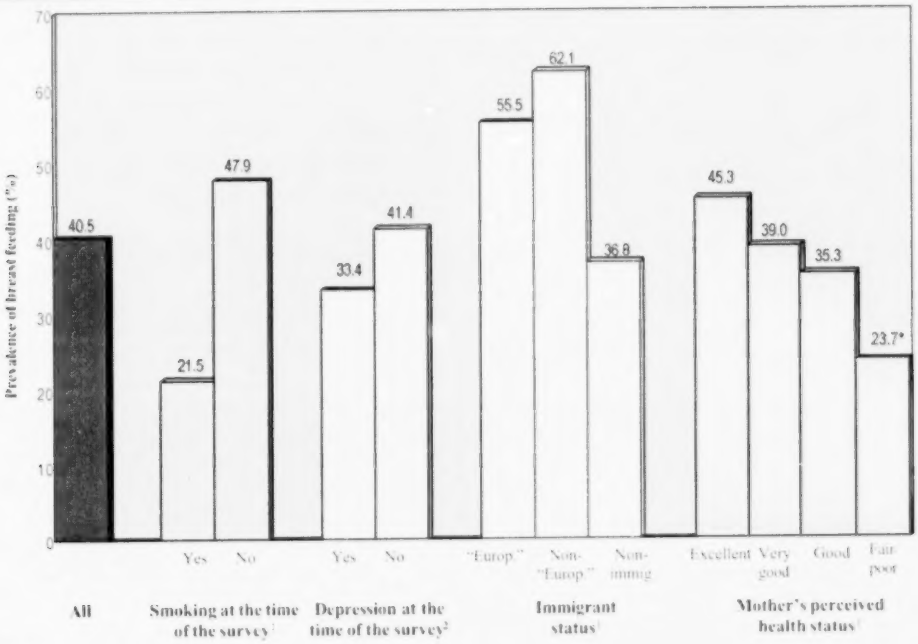


1. The curves end at 17 weeks (approximately 4 months), namely the age attained by the youngest infants in the survey.
2. Includes mothers with a diploma from a vocational/technical school.

Source: *Institut de la statistique du Québec, ÉLDEQ 1998-2002.*

Figure 2.6

Prevalence of Total Breast Feeding at 4 Months, by Certain Characteristics of the Mother, 1998



1 $p < 0.001$.

2 $p < 0.05$.

* Coefficient of variation (CV) between 15% and 25%, interpret with caution.

Source: *Institut de la statistique du Québec, ÉLDEQ 1998-2002.*

It seems that depression (symptoms) at the time of the survey[12] was not associated with the prevalence of breast feeding at birth, but was inversely associated with its prevalence at 4 months. The same was observed for total breast feeding at 2 months and 3 months ($p < 0.05$), and for exclusive breast feeding at 1 week, at 1 month and 2 months ($p < 0.01$) (data not shown). Smoking at the time of the survey, for the mother, was associated with a lower prevalence of breast feeding (Figures 2.5 and 2.6). The same was observed for all ages studied and for all types of breast feeding ($p < 0.001$) (data not shown). The same associations were also observed for mothers who had smoked during pregnancy (data not shown). The survey revealed similar proportions for mothers who had smoked and those who had not smoked during pregnancy (25% vs. 75%) and at the time of the survey (28% vs. 72%). It can be surmised that this involved the majority of the same mothers, and that they had also smoked during the first months of the infant's life. The results showed that 58% of mothers who had smoked during pregnancy had breast fed their baby at birth compared to 77% of non-smoking mothers (data not shown).

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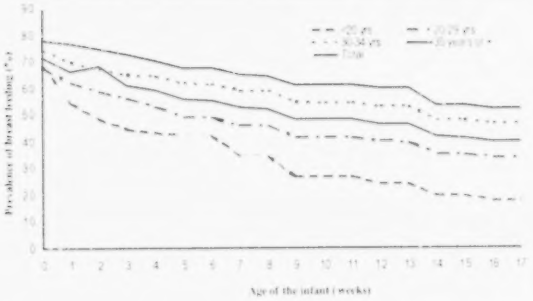
of association was observed for each type of breast feeding studied (data not shown).

Figure 2.7
Prevalence of Total Breast Feeding at Various Ages, by Age Group of the Mother at the Time of the Survey, 1998[1]

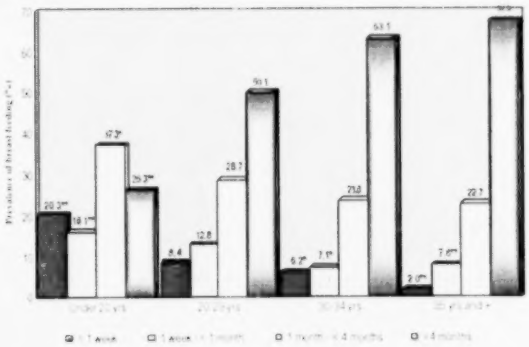


1. The curves end at 17 weeks (approximately 4 months), namely the age attained by the youngest infants in the survey.

Source: *Institut de la statistique du Québec, ÉLDEQ 1998-2002.*

To complement the preceding data, Figure 2.8 presents the association between the age of the mother and the duration of breast feeding for infants who had been breast fed or continued to be. Infants with younger mothers were less likely than those with mothers in the other age groups to be breast fed for 4 months or longer. This suggests it is important to provide good support for young mothers who choose to breast feed, since they have a tendency to abandon it earlier than older mothers. The association tended to be gradual from one age group to another. It should be noted that differences in the duration of breast feeding between younger mothers (under 30 yrs) and older ones (30 yrs and over) seemed to increase when the infant went from 2 months to 3 months of age (data not shown).

Figure 2.8
Duration of Total Breast Feeding, by Age Group of the Mother at the Time of the Survey, 1998[1]



1. $p < 0.001$.

* Coefficient of variation (CV) between 15% and 25%; interpret with caution.

** Coefficient of variation (CV) higher than 25%; imprecise estimate for descriptive purposes only.

Source: *Institut de la statistique du Québec, ÉLDEQ 1998-2002.*

Similarly, educational level of the mother was positively associated with prevalences of total breast feeding at various ages (Figure 2.9).

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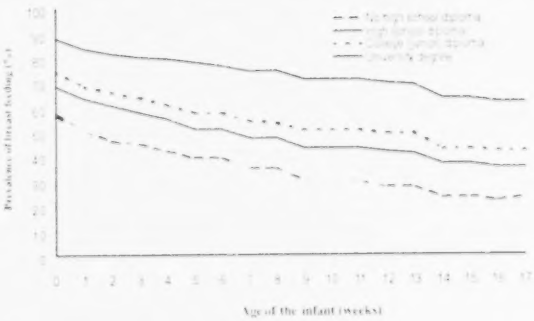
Prevalence of Total Breast Feeding at Various Ages, by Educational Level of the Mother at the Time of the Survey, 1998[1]



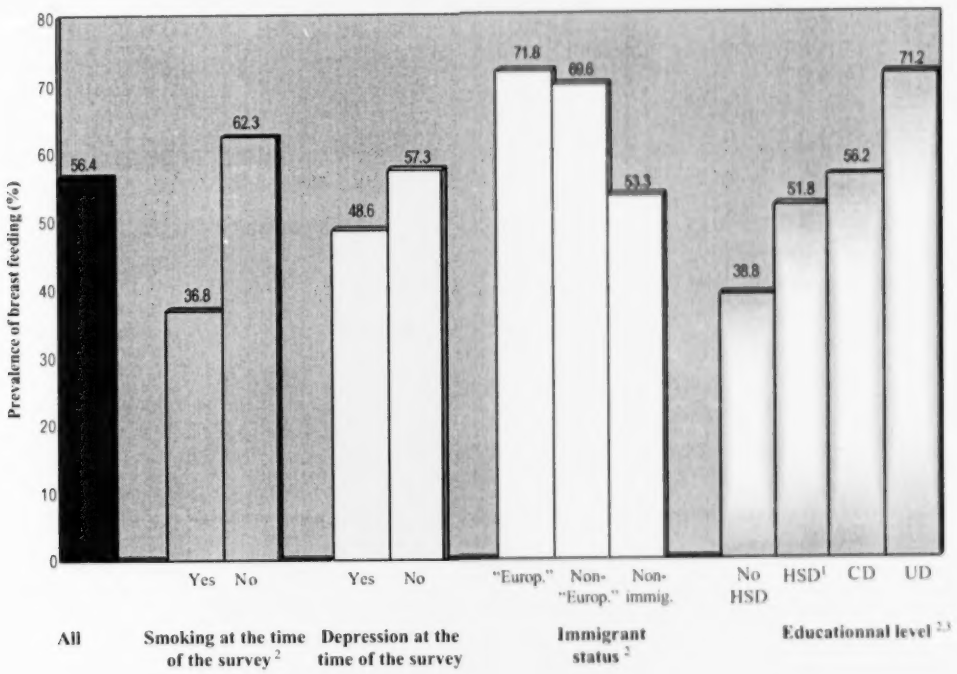
1. The curves end at 17 weeks (approximately 4 months), namely the age attained by the youngest infants in the survey.
2. Includes mothers with a diploma from a vocational/technical school.

Source: *Institut de la statistique du Québec, ÉLDEQ 1998-2002.*

Babies whose mothers had a university degree were approximately twice as likely at the age of 1 month (79% vs. 42%) and nearly three times more likely at the age of 3 months (64% vs. 23%) and 4 months (62% vs. 22%) to benefit from being breast fed compared to babies whose mother did not have a high school diploma ($p < 0.001$). This association was not unique to mothers with low educational level, since it seemed gradual from one educational level to another. It therefore would be advisable to target all mothers in interventions promoting breast feeding.

Finally, breast fed infants were more likely to have been breast fed for 4 months or more if the mother was a non-smoker, not suffering from symptoms of depression at the time of the survey, more educated, or a "European" or non-"European" immigrant rather than non-immigrant (Figure 2.10). The mother's perception of her health status was not associated with the duration of breast feeding (data not shown).

Figure 2.10
Duration of Total Breast Feeding 4 Months or Longer, by Certain Characteristics of the Mother, 1998



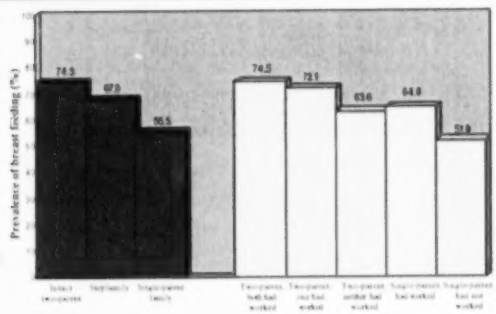
1. Includes mothers with a diploma from a vocational/technical school.
2. $p < 0.001$.
3. HSD High School Diploma
   CD College (junior) Diploma
   UD University Degree.

Source: *Institut de la statistique du Québec, ÉLDEQ 1998-2002.*

2.2.3 Family and Socioeconomic Environment

Birth order of the infant and type of family were two characteristics associated with the feeding method chosen for the child. It seems that firstborns were more likely to be breast fed at birth (75%) compared to their younger sisters or brothers (69%) ($p < 0.01$) (data not shown). The duration of breast feeding, however, was not associated with the infant's birth order (data not shown). Figure 2.11 shows the association between the type of family and the prevalence of breast feeding at birth. A larger proportion of infants in intact two-parent and stepfamilies were breast fed compared to those in single-parent families (74% and 68% vs. 56%). This association could in part be a manifestation of the effect of income, since the prevalences of breast feeding seemed to be higher in children whose parents had worked in the year preceding the survey, compared to infants whose parents had been unemployed, whether in a two-parent or single-parent family. Differences in the rates of breast feeding at birth between single-parent and two-parent families for the same employment status of the parents, namely 52% vs. 63% for unemployed parents and 65% vs. 72% when only one parent worked, were not statistically significant.[13]

Figure 2.11
Prevalence of Breast Feeding at Birth, by Type of Family and Number of Parents at Work at Any Time in the Previous 12 Months, 1998[1]



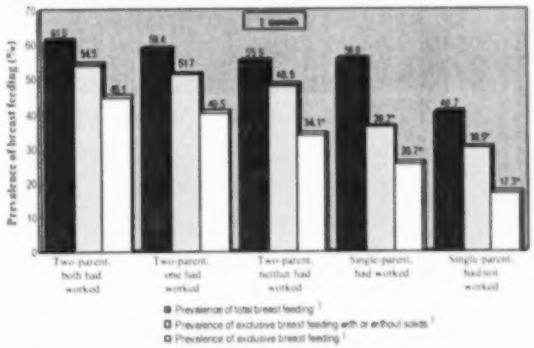
1. $p < 0.001$.

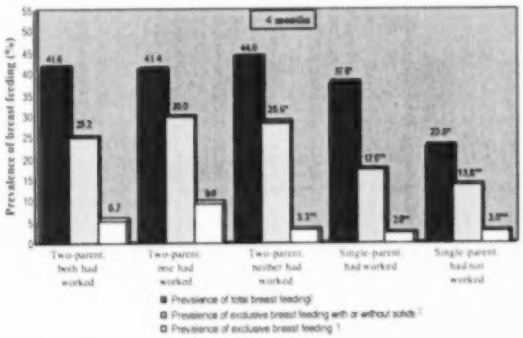
Source : Institut de la statistique du Québec, *ÉLDEQ 1998-2002*.

13. However, it should be noted that the small numbers in the categories of two-parent families with no parent who had worked (4% of all infants), single parent who had worked (3%), and single parent who had not worked (6%), may have influenced the measurement of the association among the variables examined.

Figure 2.12 illustrates the association between the prevalences of total, exclusive with or without solids, and exclusive breast feeding, first at 1 month, then at 4 months, by type of family and number of parents who had worked in the 12 months preceding the survey.

Figure 2.12
Prevalence of Breast Feeding, Total, Exclusive With or Without Solids, and Exclusive, at 1 Month and 4 Months, by Type of Family and Number of Parents at Work at Any time in the Previous 12 Months, 1998





1. $p < 0.001$.
2. $p < 0.01$.
3. $p < 0.05$.

* Coefficient of variation (CV) between 15% and 25%; interpret with caution.

** Coefficient of variation (CV) higher than 25%; imprecise estimate for descriptive purposes only.

Source: *Institut de la statistique du Québec, ÉLDEQ 1998-2002.*

It is noteworthy that though the prevalence of total breast feeding for infants in a single-parent household where the parent had worked during the year preceding the survey (56% at 1 month and 38% at 4 months) was nearly that of infants in a two-parent household where only one parent had worked (59% at 1 month and 41% at

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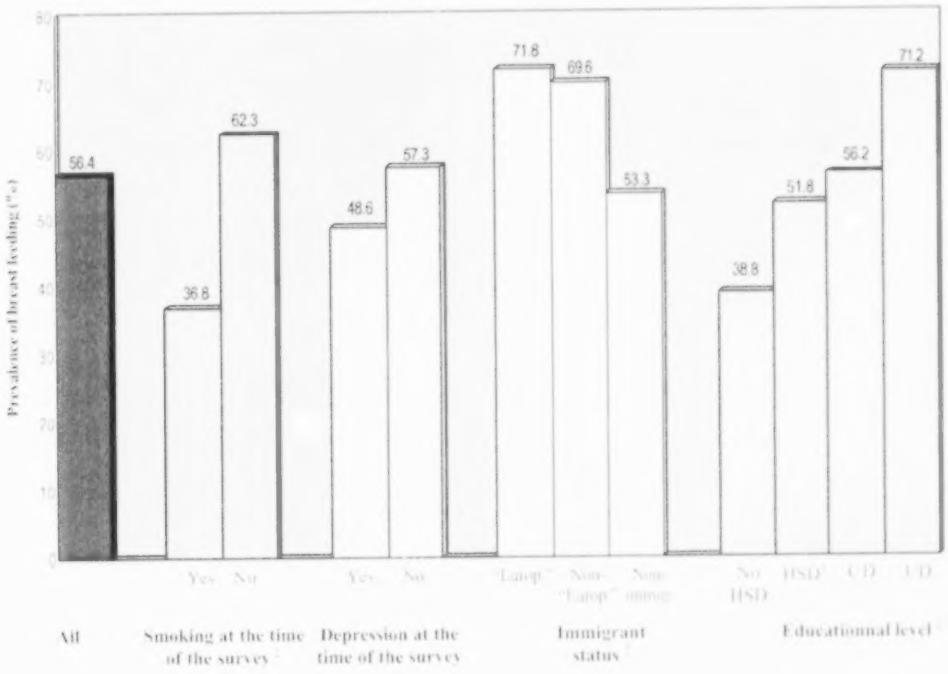

1. Includes mothers with a diploma from a vocational/technical school.
2. $p < 0.001$.
3. HSD: High School Diploma
   CD: College (junior) Diploma
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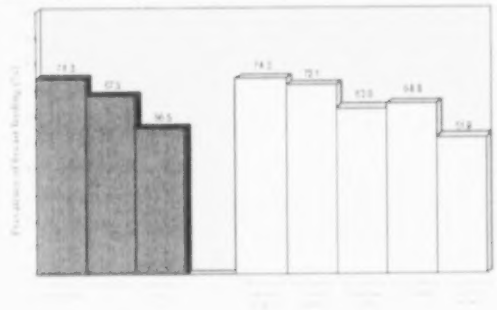
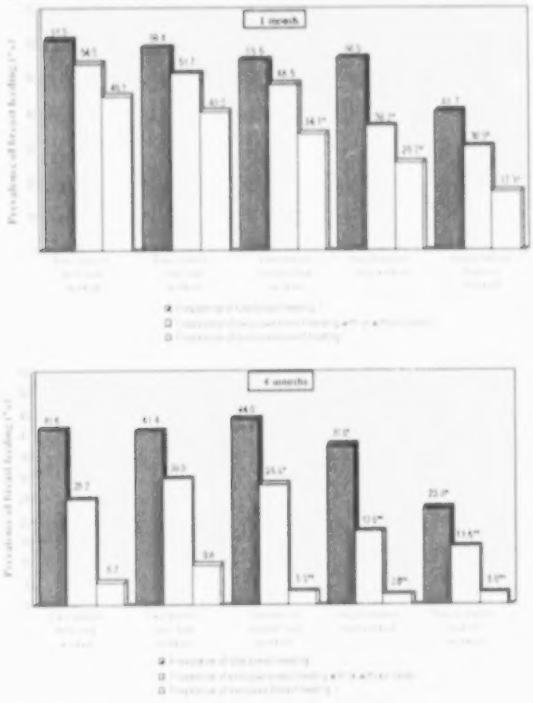


1 $p < 0.001$

Source: Institut de la statistique du Québec, *ELDEQ 1998-2002*.

Figure 2.12 illustrates the association between the prevalences of total, exclusive with or without solids, and exclusive breast feeding, first at 1 month, then at 4 months, by type of family and number of parents who had worked in the 12 months preceding the survey.

Figure 2.12
Prevalence of Breast Feeding, Total, Exclusive With or Without Solids, and Exclusive, at 1 Month and 4 Months, by Type of Family and Number of Parents at Work at Any time in the Previous 12 Months, 1998



1 $p < 0.001$
2 $p < 0.01$
3 $p < 0.05$
* Coefficient of variation (CV) between 15% and 25%, interpret with caution.
** Coefficient of variation (CV) higher than 25%, imprecise estimate for descriptive purposes only.

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It is noteworthy that though the prevalence of total breast feeding for infants in a single-parent household where the parent had worked during the year preceding the survey (56% at 1 month and 38% at 4 months) was nearly that of infants in a two-parent household where only one parent had worked (59% at 1 month and 41% at

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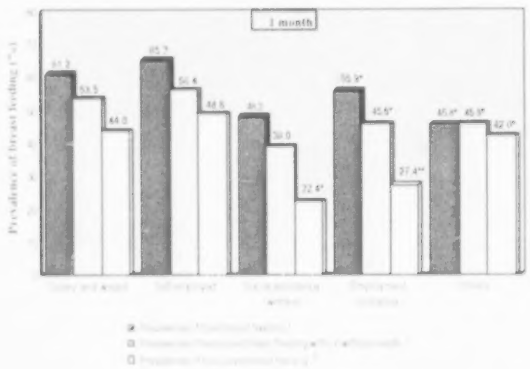
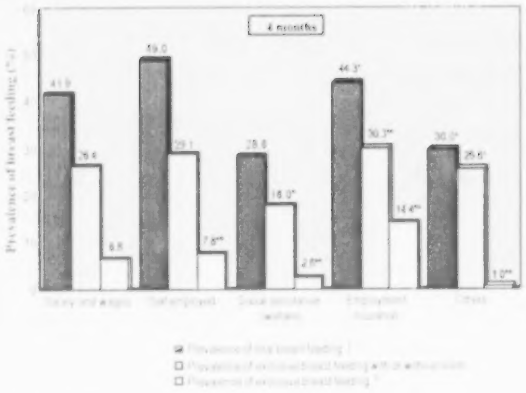
4 months), it was lower for exclusive breast feeding (26% vs. 41% at 1 month and 3% vs. 10% at 4 months). This association may indicate the importance of spousal/partner support in exclusive breastfeeding. Moreover, the prevalences observed for exclusive breast feeding at 4 months were lower in two-parent households with two incomes than in those where only one parent had worked in the 12 months preceding the survey (6% vs. 10%, $p < 0.01$). This trend may reflect the difficulty in continuing to exclusively breastfeed for mothers who have already returned to work or plan to do so following an interruption. The 1998 ELDEQ data reveal that the prevalences of breast feeding at 4 months, whether total, exclusive with or without solids, or exclusive, were significantly lower in mothers who were working at the time of the survey, when the infant was approximately 5 months old (data not shown). Information gathered in future phases of ELDEQ 1998-2002 will provide data on the link between breast feeding and maternal employment that can be studied retrospectively.

Figure 2.13 shows the association between the main source of household income and the prevalences of various types of breast feeding at 1 and 4 months. For example, the prevalences of total breast feeding at 1 and 4 months were lower in families living on welfare (12% of families) or for those who indicated the source of income as "other," compared to families whose main source was salary or income from self-employment.

Figure 2.13
Prevalence of Breast Feeding, Total, Exclusive with or Without Solids, and Exclusive, at 1 Month and 4 Months, by Main Source of Household Income, 1998





1. $p < 0.001$
2. $p < 0.01$
3. $p < 0.05$

* Coefficient of variation (CV) between 15% and 25%, interpret with caution

** Coefficient of variation (CV) higher than 25%, imprecise estimate for descriptive purposes only

Source: *Institut de la statistique du Québec, ÉLDEQ 1998-2002*

These elements were then examined in relation to socioeconomic status of the family. Figure 2.14 illustrates the positive association between annual household income and the prevalence of total breast feeding at the various ages studied. The prevalence of breast feeding at birth was very low for the lowest income level (< $10,000), but increased when income was between $10,000 and less than $20,000, then decreased in the remaining categories (between $20,000 and $50,000). At first glance, such results may suggest there has been a certain positive effect of government programs for mothers in disadvantaged households, but these programs may have had less of an impact on the poorest households (income < $10,000).

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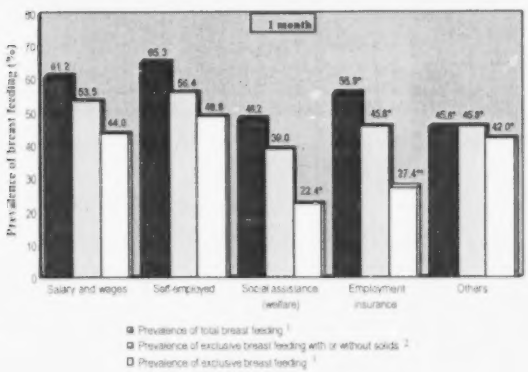

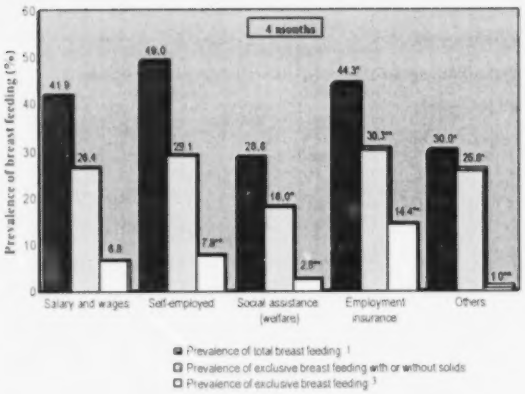

1. $p < 0.001$.
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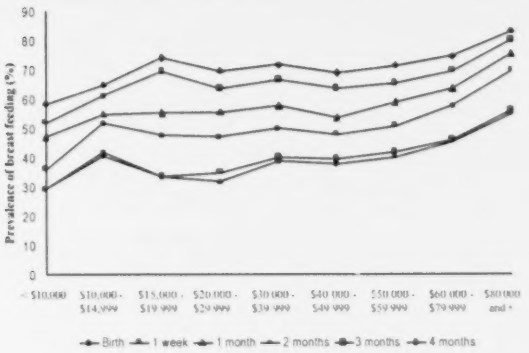
** Coefficient of variation (CV) higher than 25%; imprecise estimate for descriptive purposes only.

Source: *Institut de la statistique du Québec, ÉLDEQ 1998-2002.*

These elements were then examined in relation to socioeconomic status of the family. Figure 2.14 illustrates the positive association between annual household income and the prevalence of total breast feeding at the various ages studied. The prevalence of breast feeding at birth was very low for the lowest income level (< $10,000), but increased when income was between $10,000 and less than $20,000, then decreased in the remaining categories (between $20,000 and $50,000). At first glance, such results may suggest there has been a certain positive effect of government programs for mothers in disadvantaged households, but these programs may have had less of an impact on the poorest households (income < $10,000).

Figure 2.14
Prevalence of Total Breast Feeding at Various Ages, by Annual Household Income, 1998[1]



1. $p < 0.001$.

Source: *Institut de la statistique du Québec, ÉLDEQ 1998-2002.*

In 1998, 13% of the mothers reported receiving government financial assistance to feed their baby, the goal being to foster breast feeding, or if not, to buy infant formula (data not shown). In spite of these programs, the prevalence of breast feeding in these disadvantaged households does not seem to match that in more financially secure ones. The ÉLDEQ data reveal that a lower proportion of infants born into families receiving these government allowances were breast fed at birth (63%) compared to infants born into families who did not receive them (73%) and who were generally in higher income households than the former ($p < 0.01$) (data not shown). The prevalence of total breast feeding at various ages was also negatively associated with insufficient household income ($p < 0.05$) (data not shown), which was the case for 28% of Québec infants (see No. 2 in this series of papers). The duration of breast feeding, however, did not seem to be associated with insufficient income or with whether or not the family was receiving government allowances for breast feeding or infant formula (data not shown).

Complementing the preceding data, lower educational level in the mother was associated with higher usage of cow's milk from the infant's birth. Whether to replace or complement breast feeding, bottle-feeding with cow's milk was a much more common practice in less educated groups (22% of mothers with no high school diploma, 11% of those who had a high school diploma, 6% of those who had a junior college diploma and 2.1%[14] in those with a university degree) ($p < 0.001$) (data not shown). Though usage of cow's milk may have been linked to lack of knowledge, it was also strongly related to income, since 18% of infants in households below the low-income cut-off had already received it by the age of 5 months, compared to 8% of those in households with sufficient income ($p < 0.001$) (data not shown). These results confirm the relevance of government programs that provide, beyond the distribution of information to mothers, coupons to buy infant formula. There was also a significant difference between non-smoking mothers and smoking ones at the time of the survey in terms of cow's milk usage (7% vs. 18%) ($p < 0.001$) (data not shown).

2.3 Deciding to Breast Feed

2.3.1 The Moment of Decision Making - A Basis for Intervention

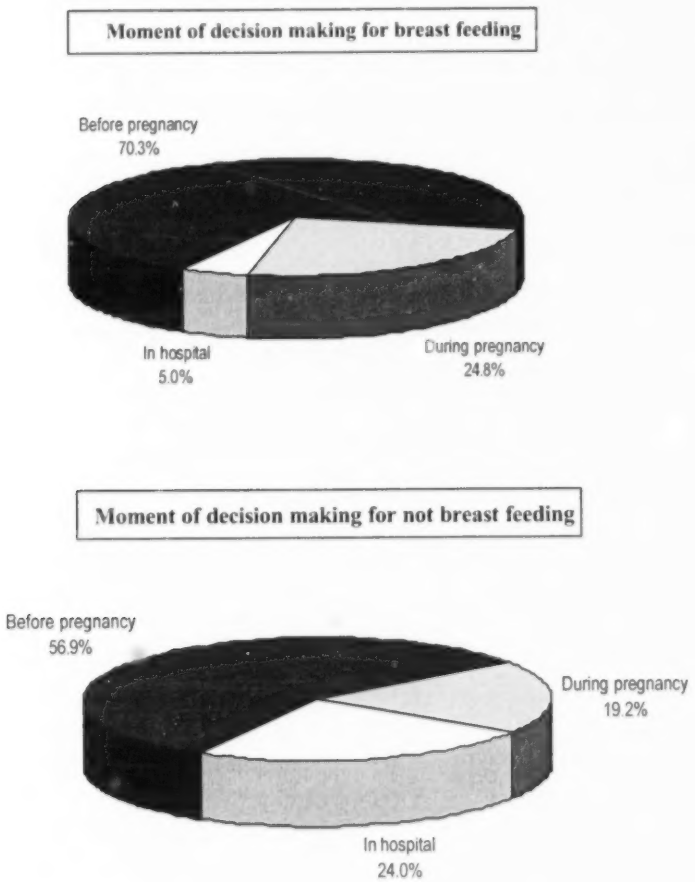
Public health interventions aimed at increasing the prevalence of breast feeding in the population can benefit from a better understanding of the elements involved in deciding to breast feed. The majority of Québec mothers who chose to breast feed their child made this decision before pregnancy (Figure 2.15). Among mothers who chose to breast feed, 70% had made the decision before pregnancy, 25% during, and only 5% at the hospital, before or after the birth. Therefore, it will be appropriate that campaigns promoting breast feeding primarily target all women of child bearing age, without waiting until they are actually pregnant. This is even more important given that the time the decision was made was associated with the duration of breast feeding ($p < 0.001$). Indeed, 61% of mothers who had decided to breast feed before pregnancy breast fed for at least 4 months. This was the case for about one in two women who had made the decision to breast feed during pregnancy (45%) or in the hospital (50%) (data not shown). Once again, this result merits consideration in the planning of interventions designed to prolong the duration of breast feeding.

14. This percentage and the preceding one (6%) should be considered as descriptive only, since the coefficient of variation was higher than 25%.

The moment of decision making for breast feeding seemed to vary with the age of the mother. Indeed, 17% of mothers under 20 years of age had made in the hospital the decision to breast feed compared to 5% or less of mothers in the other age groups (Figure 2.16). This suggests that interventions made at the time of the birth, mainly targeting young mothers, would be appropriate.

ÉLDEQ data showed that mothers under 30 years of age were less likely than older ones to have made the decision to breast feed before pregnancy. The moment of decision making for breast feeding was also associated with the birth order of the infant, the decision having been made more often before pregnancy when an older child had already paved the way ($p < 0.001$) (data not shown).

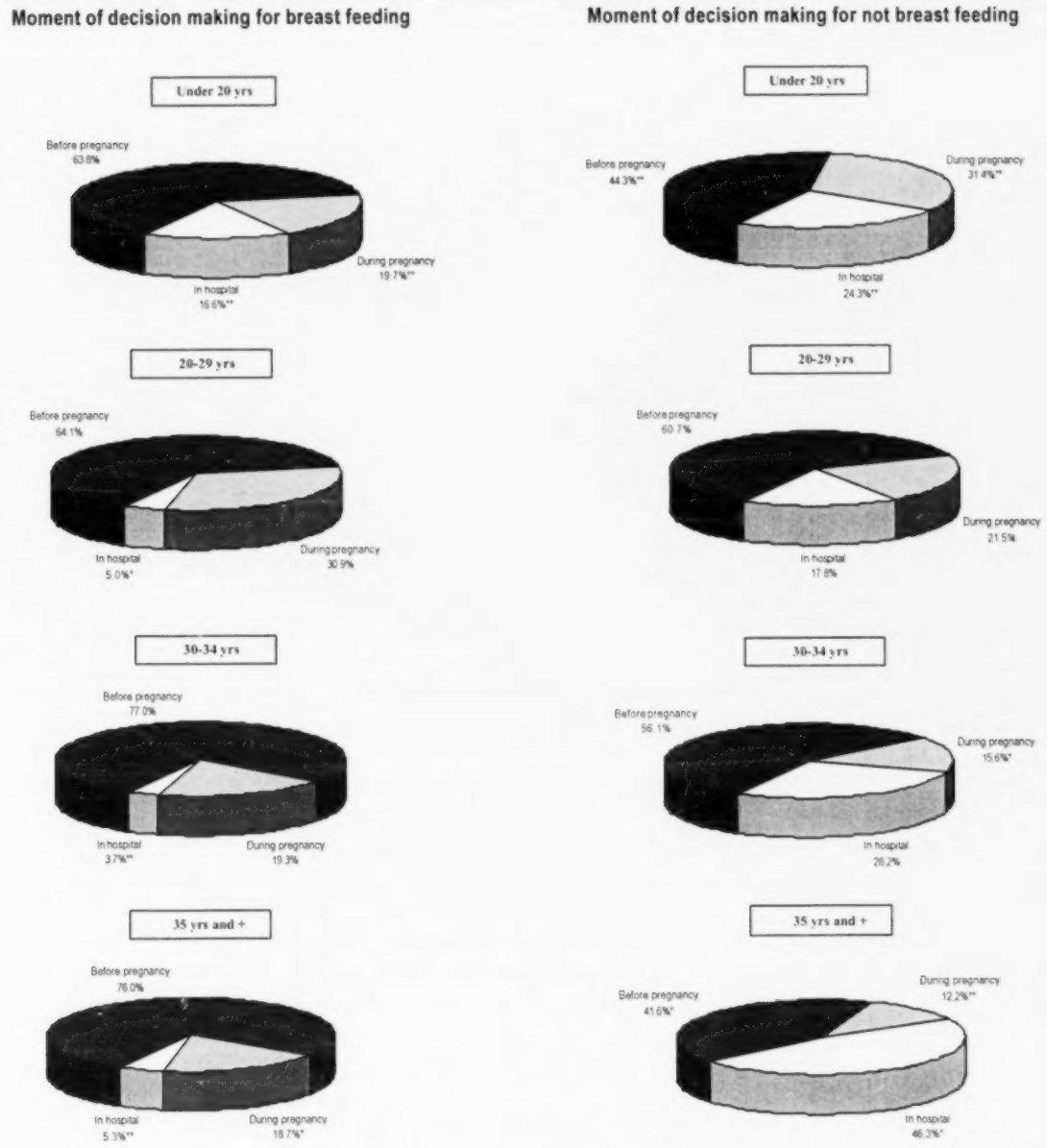
Figure 2.15
Moment of Decision Making for Breast Feeding or Not, 1998



Source: *Institut de la statistique du Québec, ÉLDEQ 1998-2002.*

Figure 2.16

Moment of Decision Making for Breast Feeding or Not, by the Age Group of the Mother, 1998[1]



1. $p < 0.001$.

* Coefficient of variation (CV) between 15% and 25%; interpret with caution.

**C oefficient of variation (CV) higher than 25%; imprecise estimate for descriptive purposes only.

Source: *Institut de la statistique du Québec, ÉLDEQ 1998-2002.*

The decision to exclusively bottle-feed the baby seems to have been made less in advance by the mothers (Figure 2.15). Indeed, 57% of mothers who chose not to breast feed had made this decision before pregnancy, 19% during pregnancy, and 24% in the hospital. In the vast majority of hospital cases (19%) however, the decision was made after the baby had been born (data not shown in Figure 2.15). This late decision may have been associated with certain circumstances surrounding the child's birth, since 47%[15] of mothers whose infant had weighed less than 2,500 grams at birth made the decision not to breast feed in the hospital, compared to 22% of those whose baby had a higher birth weight ($p < 0.01$) (data not shown). For descriptive purposes only, mothers 20 to 34 years of age having chosen not to breast feed seemed more likely to have made their decision before pregnancy, compared to mothers under 20 years of age and those 35 and over (Figure 2.16). Similarly, the moment of decision making for not breast feeding was associated with the birth order of the infant, since this decision was made more frequently before pregnancy when the infant was the second or subsequent child (66% vs. 42% for a firstborn) ($p < 0.001$) (data not shown). In such cases, it would be important to ensure that the decision was not due to a disappointing experience in breast feeding the firstborn. Again these results underline the importance of conducting breast feeding promotion campaigns for mothers before the child's birth and if possible before pregnancy, and of providing the necessary support to mothers who have had certain negative experiences making the practice appear difficult.

2.3.2 Choosing to Breast Feed or Not - Reasons Given and Family or Other Persons Influence

Various reasons motivated the decision to breast feed. The majority of mothers (84%) who breast fed their infant reported having made this choice primarily for the health of their baby. Other respondents indicated psychosocial reasons (12%), notably reinforcement of the mother/child bond, or financial or practical reasons (3.9%). In cases where the mother had decided not to breast feed, the 1998 data revealed that practical considerations were the prime motivation in 40% of cases, notably lack of time and the spouse/partner's participation in feeding the baby. Previous problems with breast feeding (10%), health or fatigue problems in the mother (14%) and mother's smoking habit (4.4%)[16] were also reported among the reasons described as physiological or health-related (42%) justifying not breast feeding. Only 18% of mothers who chose to bottle-feed their infant indicated having decided this for psychosocial reasons, notably because they said they felt awkward about breast feeding (6%)[17] (data not shown).

Mothers also invoked various reasons for ceasing to breast feed, particularly physiological ones (78%). More than half cited difficulties encountered while breast feeding, saying for example that "the child does not want to take the breast" or referring to "insufficient milk," "breast pain," etc. Practical reasons were also mentioned (22%), notably lack of time (12%), as well as returning to work or school (7%). Mothers who stopped breast feeding earlier tended to do so for a physiological rather than any other reason. This was the case for 91% of those who had breast fed for less than one week and for 92% of those who had done so between 7 and 29 days inclusively (data not shown).

The family and other persons' attitudes towards breast feeding can also influence the decision whether to do so (Sage Research Corporation, 1995; Séguin *et al.*, 1998). In general, Québec mothers perceived a favourable attitude towards breast feeding among significant people in their lives (Table 2.2). It seems that it was their own mothers, compared to others, who had the lowest frequency of a favourable attitude (73%) and the highest frequency of an unfavourable attitude (10%) towards breast feeding. It should be noted that 83% of Québec mothers whose spouse/partner seemed favourable towards breast feeding chose to breast feed, and 79% of those who perceived their spouse/partner as not favourable to the idea of breast feeding did not indeed do so ($p < 0.001$) (data not shown). The attitude of the spouse was also associated with the moment of decision making for breast feeding ($p < 0.001$). Indeed, the perception of a positive rather than negative attitude in the spouse/partner seemed to foster making the decision before pregnancy (72% vs. 48% [Coefficient of variation (CV) between 15% and 25%; interpret with caution]; $p < 0.01$)

15. Coefficient of variation (CV) between 15% and 25%; interpret with caution.

16. The proportions of 6% and 4.4% in this paragraph should be interpreted with caution because of the small numbers involved (coefficient of variation between 15% and 25%).

17. Coefficient of variation (CV) between 15% and 25%, interpret with caution.

(data not shown). Such results match those of other studies (Littman *et al.*, 1994). Freed & Fraley (1993) reported, however, that mothers who want to breast feed tend to perceive a more favourable attitude in their spouse compared to those who do not intend to.

The attitude of family members can also influence the duration of breast feeding (Table 3). Among mothers who perceived a very favourable or favourable attitude on the part of their spouse/partner or mother, a larger proportion breast fed for 4 months or more, compared to those who perceived a neutral or unfavourable to very unfavourable attitude (from 58% to 60% vs. from 26% to 39%).

Table 2.2
Attitude of Various People Towards Breast Feeding, as Perceived by the Mother, 1998

	Mother's perception of attitude towards breast feeding		
	Favourable & very favourable	Neutral	Unfavourable & very unfavourable
	%		
Spouse/partner	83.2	11.7	5.1
Mother (of the mother)	72.7	17.2	10.1
Other family members	74.7	19.6	5.6
Friends	78.5	17.6	3.9
Doctor (during pregnancy)	84.2	15.1	0.7**
Nurses (at the hospital)	86.6	11.8	1.7*

* Coefficient of variation (CV) between 15% and 25%; interpret with caution.

** Coefficient of variation (CV) higher than 25%; imprecise estimate for descriptive purposes only.

Source: *Institut de la statistique du Québec, ÉLDEQ 1998-2002.*

Table 2.3
Duration of Breast Feeding by Attitude of Various Family Members as Perceived by the Mother, 1998

Family member	Perception of attitude towards breast feeding	Duration of breast feeding		p
		< 1 week	• 4 months	
		%		
Spouse/ partner	Very favourable and favourable	5.9	58.1	p < 0.001
	Neutral	26.8*	26.3*	
	Unfavourable and very unfavourable	22.4**	36.2**	
Mother	Very favourable and favourable	5.2	60.2	p < 0.001
	Neutral	10.4**	38.5	
	Unfavourable and very unfavourable	18.9*	39.1	
Other family members	Very favourable and favourable	5.9	59.6	p < 0.001
	Neutral	11.6*	43.7	
	Unfavourable and very unfavourable	14.1**	31.9*	

* Coefficient of variation (CV) between 15% and 25%; interpret with caution.

**C oefficient of variation (CV) higher than 25%; imprecise estimate for descriptive purposes only.

Source: *Institut de la statistique du Québec, ÉLDEQ 1998-2002.*

3. Introduction of Solid Foods

Up to the ages of 4 to 6 months, breast milk, or by default, infant formula, are considered sufficient to fulfill the nutritional needs of young babies. After this, babies are generally ready to receive other foods to satisfy their increasing need for energy and nutrients in order to ensure proper development. The recommendation is to begin introducing complementary foods between the 4th and 6th month of life (*Société canadienne de pédiatrie et al.*, 1998). Though the recommendations for the age of introducing solid foods are based on the physiological development of the child, the order in which they are introduced varies with cultures and child-rearing practices (*Société canadienne de pédiatrie et al.*, 1998). The recommendation is to start with foods rich in iron to prevent a deficiency in this nutrient (*Société canadienne de pédiatrie et al.*, 1998). In Québec, the suggestion is to first give iron-fortified baby cereals at about the age of 4-5 months. Following the introduction of cereals, vegetables and fruits are recommended around the age of 5-6 months, and fruit juice at around 6 months. Finally, meat and alternatives, because of their high protein content, should normally be incorporated into the diet after the age of 6 months so as not to overload the baby's kidneys (Doré & Le Hénaff, 1997).[18] Table 3.1 presents a summary of what is generally recommended in Québec and the mean age of introduction of complementary foods for the infants surveyed in 1998.

Table 3.1
Mean Age of Infants When Various Types of Solid Foods Were Introduced, Compared to the Recommendations, 1998

Food	Mean age (months)	Recommendations[1] (months)
Cereal (grains)	3.0[2]	4-5
Vegetables	3.8[3]	5-6
Fruit	3.9[4]	5-6
Fruit juice	3.7[5]	6
Meat	4.5[6]	6

1. According to Doré & Le Hénaff, 1997.
2. Concerns 92% of the infants.
3. Concerns 72% of the infants.
4. Concerns 57% of the infants.
5. Concerns 26% of the infants.
6. Concerns 11% of the infants.

Source: *Institut de la statistique du Québec, ÉLDEQ 1998-2002.*

According to the ÉLDEQ data, at the age of 5 months, 93% of infants had begun to consume some type of solid foods (data not shown). For these children the mean age of introduction of the first solid, usually a baby cereal, was 3 months. More than 9 in 10 infants (92%) had begun eating baby cereal at the time of the study. The mean age of introducing this was 3.0 months (age of introduction varied between 6 days and 6 months). At the time of the study, 72% of infants had been eating vegetables since the mean age of 3.8 months (age of introduction varying between 1 day and 6 months), 57% had been eating fruits since the mean age of 3.9 months (age of introduction varying between 3 days and 6 months), 26% had been drinking fruit juice since the mean age of 3.7 months (mean age of introduction varying between 1 day and 6 months), and more than one in ten (11%) had been eating meat since the mean age of 4.5 months (age of introduction varying between 4 weeks and 7 months).

18. These particular recommendations for various foods provide guidance to parents in the transition to complementary foods, and are found in the booklet *Mieux vivre avec son enfant* (Doré & Le Hénaff, 1997) (From Tiny Tot to Toddler), handed out free to all mothers giving birth in a hospital or birthing centre in Québec.

Table 3.2 indicates the frequency of what can be considered an early introduction of various complementary foods.[19] Cereals were introduced to more than half of the infants (58%) before the recommended age of 4 months. Again, before the age of 4 months, more than a quarter (27%) had begun consuming vegetables, 19% fruits, 11% fruit juice and 1.4% meat.

Table 3.2
Frequency of Early Introduction of Various Types of Solid Foods, at Various Ages of the Infants, 1998

	Age (months)				Total
	<1 month	• 1 month to < 2 months	• 2 months to < 3 months	• 3 months to < 4 months	Before 4 month
	%				
Cereal (grains)	4.4	10.6	14.5	28.6	**58.1**
Vegetables	0.7**	1.5**	6.0**	18.3**	**26.5**
Fruit	0.4**	1.3**	4.8**	12.3**	**18.8**
Fruit juice	0.4**	1.0**	2.2**	7.1**	**10.7**
Meat	0.2**	0.1**	0.3**	0.8**	**1.4***

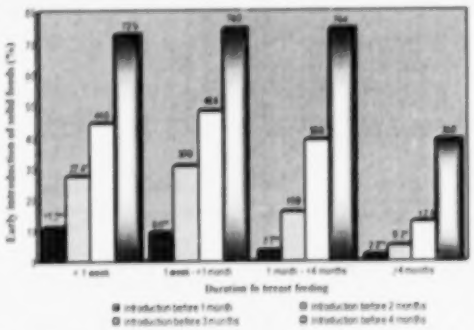
* Coefficient of variation (CV) between 15% and 25%; interpret with caution.

**C oefficient of variation (CV) higher than 25%; imprecise estimate for descriptive purposes only.

Source: *Institut de la statistique du Québec, ÉLDEQ 1998-2002.*

In summary, even though it is recommended to breast feed exclusively until the minimum age of 4 months (*Société canadienne de pédiatrie et al.*, 1998), a relatively high percentage of Québec parents did not seem to be following this recommendation in 1998. Indeed, 10% of infants being exclusively breast fed with or without solids at the age of 3 months and 32% of those who did so at the age of 4 months had begun eating solid foods at these ages respectively. However, the early introduction of solid foods was a more common practice among infants who were not being breast fed. More than three quarters (78%) of babies being only bottle-fed had begun to consume some type of solid food before the age of 4 months, while a little more than half (54%) of breast fed babies had already begun eating solid foods by this age (data not shown). The 1998 ÉLDEQ data reveal that compared to mothers having breast fed for a shorter period of time, mothers who breast fed their baby 4 months or longer were less likely to have introduced solid foods too early (early introduction before 3 months and before 4 months) (Figure 3.1).

Figure 3.1
Early Introduction of Solid Foods at Various Ages (Cumulative Percentages), by Duration of Total Breast Feeding, 1998[1]



1. $p < 0.001$.

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** Coefficient of variation (CV) higher than 25%; imprecise estimate for descriptive purposes only.

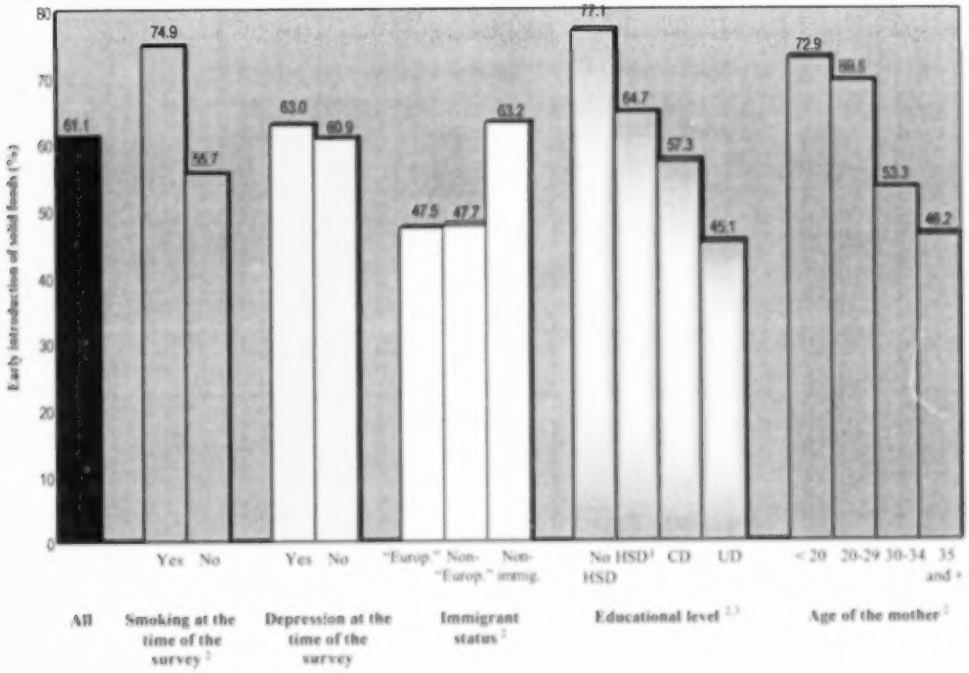
Source: *Institut de la statistique du Québec, ÉLDEQ 1998-2002.*

Finally, it should be noted that consumption of cow's milk was more frequent in babies who had begun eating solid foods early (14%) compared to those who had not begun to eat solid foods at 4 months (3.6%)[20] ($p < 0.001$) (data not shown). The early introduction of solid foods was also associated with various characteristics of the mother, as shown in Figure 3.2.

19. The criterion of early introduction of solid foods was set "before the age of 4 months" because, according to the recommendations, in general, the age of transition to solid foods should be at least 4 months. Moreover, it should be underlined that the youngest in this survey were 4 months old, with the exception of one infant. However, this resulted in the prevalence of early introduction of certain foods being underestimated in cases where the recommendations are higher than 4 months, some of these infants not having yet attained the specific recommended age.

20. Coefficient of variation (CV) between 15% and 25%; interpret with caution.

Figure 3.2
Early Introduction of Solid Foods, by Certain Characteristics of the Mother, 1998



1. Includes mothers with a diploma from a vocational/technical school.
2. $p < 0.001$.
3. HSD High School Diploma
   CD College (junior) Diploma
   UD University Degree.

Source: *Institut de la statistique du Québec, ÉLDEQ 1998-2002.*

Mothers born in Canada were more likely to introduce solid foods too early compared to immigrant mothers (63% vs. 48%). This was also the case for about 70% of the mothers under 30 years of age compared to about half (50%) of older ones. This practice was also associated with smoking or a lower educational level among mothers. It is important to note that the early introduction of solid foods was associated with higher weight gain in the infant ($p < 0.001$) (data not shown). Some researchers have examined the impact of early introduction of solid foods on child development. Heinig *et al.* (1993) reported a positive association between the early introduction of solids and psychomotor development. They suggest there could be an inverse causal relationship, namely that the parent may have a tendency to give solids earlier to more precocious infants. In addition, these researchers noted that solids did not replace infant formula for a child being fed formula, but replaced breast milk for babies being breast fed; in other words, mothers tend to stop breast feeding once solid foods are introduced into their child's diet.

Table 3.2 indicates the frequency of what can be considered an early introduction of various complementary foods.[19] Cereals were introduced to more than half of the infants (58%) before the recommended age of 4 months. Again, before the age of 4 months, more than a quarter (27%) had begun consuming vegetables, 19% fruits, 11% fruit juice and 1.4% meat.

Table 3.2
Frequency of Early Introduction of Various Types of Solid Foods, at Various Ages of the Infants, 1998

	Age (months)				Total
	<1 month	≥ 1 month to < 2 months	≥ 2 months to < 3 months	≥ 3 months to < 4 months	Before 4 month
	%				
Cereal (grains)	4.4	10.6	14.5	28.6	58.1
Vegetables	0.7**	1.5**	6.0**	18.3**	26.5
Fruit	0.4**	1.3**	4.8**	12.3**	18.8
Fruit juice	0.4**	1.0**	2.2**	7.1**	10.7
Meat	0.2**	0.1**	0.3**	0.8**	1.4*

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In summary, even though it is recommended to breast feed exclusively until the minimum age of 4 months (*Société canadienne de pédiatrie et al.*, 1998), a relatively high percentage of Québec parents did not seem to be following this recommendation in 1998. Indeed, 10% of infants being exclusively breast fed with or without solids at the age of 3 months and 32% of those who did so at the age of 4 months had begun eating solid foods at these ages respectively. However, the early introduction of solid foods was a more common practice among infants who were not being breast fed. More than three quarters (78%) of babies being only bottle-fed had begun to consume some type of solid food before the age of 4 months, while a little more than half (54%) of breast fed babies had already begun eating solid foods by this age (data not shown). The 1998 ELDEQ data reveal that compared to mothers having breast fed for a shorter period of time, mothers who breast fed their baby 4 months or longer were less likely to have introduced solid foods too early (early introduction before 3 months and before 4 months) (Figure 3.1).

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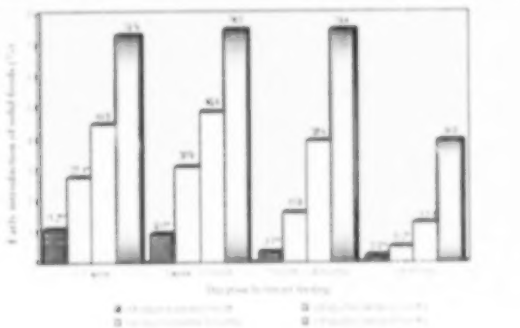

1. $p < 0.001$.

* Coefficient of variation (CV) between 15% and 25%, interpret with caution.

** Coefficient of variation (CV) higher than 25%, imprecise estimate for descriptive purposes only.

Source: *Institut de la statistique du Québec, ELDEQ 1998-2002.*

Finally, it should be noted that consumption of cow's milk was more frequent in babies who had begun eating solid foods early (14%) compared to those who had not begun to eat solid foods at 4 months (3.6%)[20] ($p < 0.001$) (data not shown). The early introduction of solid foods was also associated with various characteristics of the mother, as shown in Figure 3.2.

19. The criterion of early introduction of solid foods was set "before the age of 4 months" because, according to the recommendations, in general, the age of transition to solid foods should be at least 4 months. Moreover, it should be underlined that the youngest in this survey were 4 months old, with the exception of one infant. However, this resulted in the prevalence of early introduction of certain foods being underestimated in cases where the recommendations are higher than 4 months, some of these infants not having yet attained the specific recommended age.

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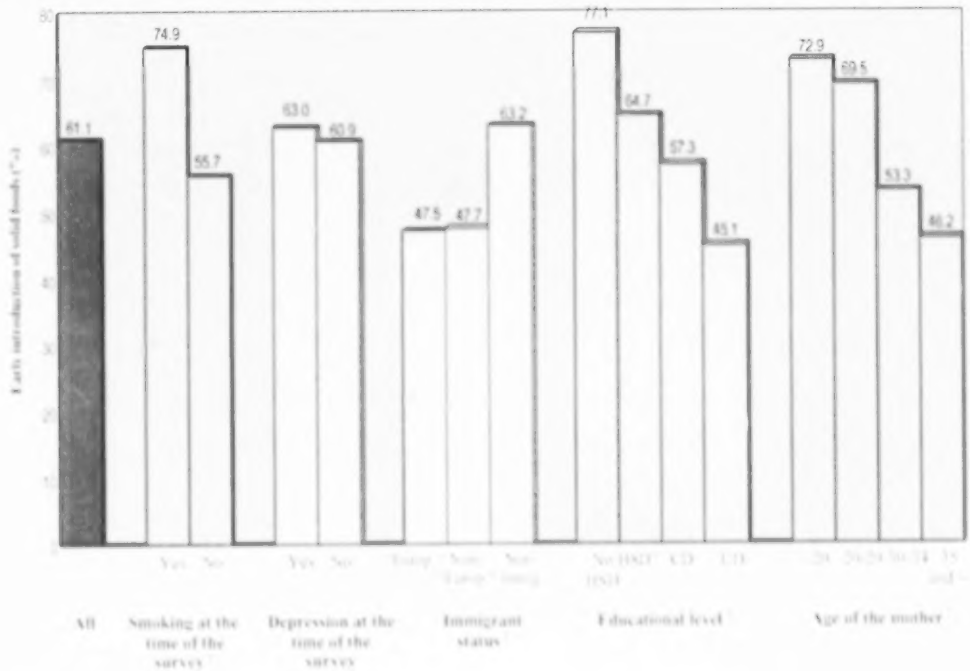

1 Includes mothers with a diploma from a vocational/technical school
2 $p < 0.001$
3 HSD High School Diploma
CD College (junior) Diploma
UD University Degree

Source : *Institut de la statistique du Québec, ELDEQ 1998-2002*

Mothers born in Canada were more likely to introduce solid foods too early compared to immigrant mothers (63% vs. 48%). This was also the case for about 70% of the mothers under 30 years of age compared to about half (50%) of older ones. This practice was also associated with smoking or a lower educational level among mothers. It is important to note that the early introduction of solid foods was associated with higher weight gain in the infant ($p < 0.001$) (data not shown). Some researchers have examined the impact of early introduction of solid foods on child development. Hering et al. (1993) reported a positive association between the early introduction of solids and psychomotor development. They suggest there could be an inverse causal relationship, namely that the parent may have a tendency to give solids earlier to more precocious infants. In addition, these researchers noted that solids did not replace infant formula for a child being fed formula, but replaced breast milk for babies being breast fed. In other words, mothers tend to stop breast feeding once solid foods are introduced into their child's diet.

4. Vitamin or Mineral Supplements

Nearly four out of ten Québec infants (39%) had taken vitamin or mineral supplements at one time or another since birth, and 12% had taken them from birth (data not shown). At the time of the survey, 23% of infants were continuing to take at least one supplement. In nearly all cases (98%), it was a supplement containing Vitamin D, and in more than half of cases (56%) it was one containing iron, most often in the form of a multi-vitamin (data not shown). It should be noted that a supplement of 400 IU of Vitamin D per day is recommended for infants being breast fed (*Société canadienne de pédiatrie et al.*, 1998). The data indicated that taking supplements was in fact more common among those who were being breast fed than among those who were not. Half of breast fed infants (50%) had taken supplements at one time or another since birth compared to 13% of those who had not been breast fed ($p < 0.001$) (data not shown). This suggests that at least half of breast fed infants were not receiving the recommended Vitamin D supplements.

Iron should also be present in sufficient quantity in an infant's diet. Up to the age of 6 months, mother's milk can constitute an important source of iron for infants who are being exclusively breast fed (Chagnon *et al.*, 1997). The iron requirements of infants can also be fulfilled by iron-fortified formula, iron-fortified cereal or supplements. As indicated earlier, 92% of infants had already begun eating cereal at the time of the survey. When they were fed formula, as a complement to or replacement of breast milk, in 69% of cases it was fortified with iron. It should however be emphasized that the data did not allow for determining the prevalence, incidence or risk of iron deficiency in the infants, a condition that can have an impact on the physical health (notably related to infections in newborns) and on the behaviour and development of the child (*Société canadienne de pédiatrie et al.*, 1998; Holst, 1998). The results of this study can be further explored in more in-depth studies on the need for vitamin and mineral supplements and their usage related to infants' diets.

5. Conclusion

The data of Year 1 (1998) of ÉLDEQ show the variability of parental behaviours in terms of diet in infancy. They also round out data already available in this field (*Développement des ressources humaines Canada* & *Statistique Canada*, 1996; Lepage & Moisan, 1998; Séguin *et al.*, 1998; *Société canadienne de pédiatrie et al.*, 1998) and will serve as a baseline for the longitudinal follow up of this Québec cohort in the years to come. It is important to evaluate practices related to infant diet on a regular basis by using comparable data. For example, the measurement of the prevalence of breast feeding varies greatly with the research methods or the definitions used for breast feeding. It will therefore be relevant to repeat this type of survey, using a similar research protocol.

One of the major elements this study has brought to light is the fact that only a small proportion of Québec infants were being exclusively breast fed in the first four months of life. Though the promotion of breast feeding is a major priority in reinforcing healthy dietary practices (*Comité Directeur Conjoint Canada*, 1996), it is important to clearly define what is understood by breast feeding, since a sizable proportion of mothers choose to breast feed, without however following all the recommendations. The data also reveal that many women who choose to breast feed cease doing so in the first few days or weeks. Hence the importance of offering good support not only in the hospital, but also at home. Appropriate evaluation before discharge from the hospital would help detect certain problems and make it possible to intervene at the right time. This is even more indicated because difficulties in breast feeding at discharge have been associated with cessation of breast feeding in the two weeks following the return home (Matthews, 1993). It would be useful to develop tools that can help predict the duration of breast feeding in Québec mothers and thereby specifically target interventions. For example, the "Breast-Feeding Attrition Prediction Tool," developed by Janke (1994), allowed the identification in advance of three quarters of mothers who had prematurely stopped breast feeding their baby. However, such tools should be adapted to the specific culture concerned.

The fact that women are in the worplace should not affect the prevalence of breast feeding so much as the duration. In fact, the return to work is associated with weaning and influences the duration of breast feeding (Visness & Kennedy, 1997). To foster a longer duration of breast feeding, in-depth research can shed light on the difficulties encountered in returning to work, as was done in Morse *et al.*, (1989). It is hoped that in the years to come, the workplace will adapt to this situation by offering, for example, a more flexible work schedule for mothers who want to continue breast feeding upon their return to work.

ÉLDEQ 1998 also brought to light the fact that Québec mothers seem to be introducing other liquids and solid foods very early into their infant's diet, whether they breast feed or not. It will be important to gain a better understanding of the reasons for this behaviour. It may be a lack of knowledge or professional support, certain beliefs or family practices, or other factors that may be influencing the attitudes and behaviours of the mother and her family, for whom interventions could be designed. The results confirm the pertinence of developing support services for mothers with young babies, as underlined by the *Groupe de travail sur le développement sain des enfants* (1999) (Working Group on the Healthy Development of Young Children, 1999), which emphasized the importance of early childhood in the development of healthy adults in order to create a healthy, productive and prosperous society.

As this study reveals, numerous social factors can influence parenting behaviours related to infant diet. Similar results have been reported by other researchers (Ford *et al.*, 1994; Kuan *et al.*, 1999; Lowe, 1994; Michaelsen *et al.*, 1994; Skinner *et al.*, 1997; *Société canadienne de pédiatrie et al.*, 1998). Many of these factors were interrelated, such as educational level, type of family and income. It will be interesting to continue such analyses to deepen our understanding of the interrelationships among these factors and identify the most promising ones for targeting interventions.

In addition, it would be beneficial to conduct complementary studies that focus on ethnic belonging. The 1998 ÉLDEQ results showed a positive relationship between immigrant status (non-"European" immigrant vs. "European" immigrant or non-immigrant) and breast feeding. These data, however, could be studied more specifically in terms of the particular ethnocultural origins of the mothers (Agnew *et al.*, 1997; Greene-Finestone *et al.*, 1989).

This study also examined the question of various elements related to the decision to breast feed and the influence of the people around the mother. More in-depth studies would shed more light on these dimensions for various social groups. As reported by Losch *et al.* (1995), a better understanding of the mothers' and family attitudes towards breast feeding would help orient promotion programs to increase the prevalence and duration. Again, according to these researchers, such programs should target the whole population to render a more positive image of breast feeding and its benefits to society. Moreover, as indicated by the results of ÉLDEQ, the decision to breast feed seems generally to be made before pregnancy and to be influenced by the attitude of the family and others close to the mother. According to some studies, it appears that even the majority of teenage girls have already made the decision regarding breast feeding for their future children (Purtell, 1994).

It is suggested that age-specific programs for teenagers be provided in schools to foster breast feeding (Friel *et al.*, 1989). Mass media messages could contribute to improving the attitude of high-school students towards breast feeding (Scott *et al.*, 1997). Furthermore, the women who tend to make decisions later, mainly young mothers, should also be targeted, by designing or adapting programs specifically aimed at them. It would also be important to further study characteristics of fathers, as did Gamble & Morse (1993), because of the strong influence they have on the attitude of mothers. The concrete support of the spouse/partner plays a positive role in the duration of breast feeding (Isabella & Isabella, 1994); hence programs targeting fathers could emphasize the value of their support for mothers who breast feed (Gamble & Morse, 1993; Scott *et al.*, 1997).

Parental behaviours therefore seem to be specific to certain contexts that are not the same for all Québec infants. There is a need to analyze family and social environments related to infants' diets in order to direct public health interventions towards alleviating health disparities over the long term. In this regard, the main transformations that seem to influence children's diets are those associated with changes in family structure (marriage, separation, single-parenthood) and the parents' situation in the workforce (changes and instability in employment, etc.).

Data collected over the years by ÉLDEQ 1998-2002 will help identify the main determinants of the nutritional status of Québec infants, thereby indicating family intervention paths. They will help reveal the long-term influence of psychosocial and socioeconomic variables on child health and development. Since the practice of breast feeding in the first year of life and a good diet constitute protective factors for growing children living in disadvantaged circumstances, it would also be appropriate to assess the impact over the medium and long terms of government programs aimed at supporting mothers with lower socioeconomic status.

The longitudinal follow up of ÉLDEQ 1998-2002 will help verify other types of associations. For example, some studies report a significant association between the infant feeding practices and cognitive development variables (Anderson *et al.*, 1999; Horwood *et al.*, 1998; Jacobson *et al.*, 1999; Malloy & Berendes, 1998; Pollock, 1994; Rogan & Gladen, 1993; Uauy & Peirano, 1999) or between physical development and behavioural problems in the child (Pollitt *et al.*, 1996). However, these associations have not been clearly established over the long term, and could be explained by confounding factors such as the educational level of the mother and father. ÉLDEQ will help verify, for example, whether Québec infants who were exclusively breast fed in the first few months of life will have a better capacity for learning, independent or not of the educational level of the parents.

Healthy development in childhood has consequences that last into adulthood. This process in turn can affect the prosperity of society as a whole (Hertzman, 1999). Analyses of ÉLDEQ 1998-2002 data will provide a better understanding of the determinants of children's diets in relationship to their development. This will contribute to developing programs that respond to specific needs as part of an overall approach reducing social inequalities in the population.

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Glossary

Centre de la petite enfance	Child-care centre
Commission d'accès à l'information du Québec - CAI	Québec Access to Information Commission
Conseil québécois de la recherche sociale (CQRS)	Social Research Council of Québec
Direction de la méthodologie et des enquêtes spéciales, ISQ	Methodology and Special Surveys Division, ISQ
Direction de la santé publique de la Régie régionale de la santé et des services sociaux de Montréal-Centre	Public Health Department, Montréal-Centre Regional Health Board
Direction de la technologie et des opérations statistiques, ISQ	Technology and Statistical Operations Division, ISQ
Direction des normes et de l'information, ISQ	Standards and Information Division, ISQ
Direction Santé Québec, ISQ	Health Québec Division
Étude des jumeaux nouveaux-nés au Québec - ÉJNQ	Québec Study of Newborn Twins
Fichier maître des naissances	Master Birth Register
Fonds de la recherche en santé du Québec (FRSQ)	Health Research Fund of Québec
Fonds pour la formation de chercheurs et l'aide à la recherche (FCAR)	Researcher Education and Research Assistance Fund
Groupe de recherche sur l'inadaptation psychosociale chez l'enfant - GRIP	Research Unit on Children's Pyschosocial Maladjustment
Institut de la statistique du Québec, ISQ	Québec Institute of Statistics
La Politique Familiale	Policy on Families
Le Rapport Bouchard (1991) « Un Québec fou de ses enfants »	The Bouchard Report, 1991: A Québec in Love with its Children
Les Priorités nationales de santé publique	Priorities for Public Health
ministère de l'Éducation	Ministry of Education
ministère de la Famille et de l'Enfance	Ministry of Family and Child Welfare
ministère de la Justice	Ministry of Justice
ministère de la Recherche, Science et Technologie	Ministry of Research, Science and Technology
ministère de la Santé et des Services sociaux du Québec (MSSS)	Ministry of Health and Social Services of Québec
ministère de la Sécurité publique	Ministry of Public Security
ministère de la Solidarité sociale	Ministry of Social Solidarity - formerly Income Security (Welfare)
Politique de la santé et du bien-être	Policy on Health and Well-Being
Service de la recherche	Research services
Service de support aux opérations de la Régie de l'assurance-maladie du Québec - RAMQ	Operations Support Section of the Québec Health Insurance Board

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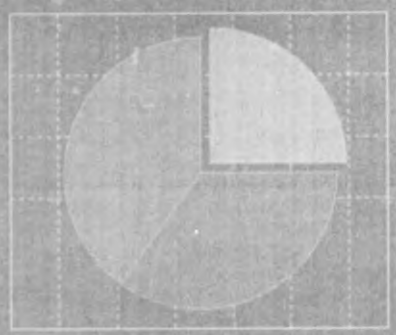
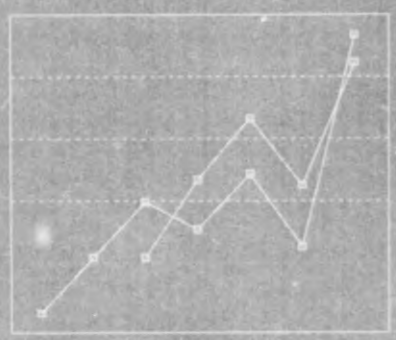
Recent Québec policy on health and well-being (*Politique de la santé et du bien-être*) has emphasized the importance of a good diet for the health of individuals. The analyses of cross-sectional data and eventually the longitudinal data of ÉLDEQ 1998-2002 will help expand our knowledge of children's diet related to various aspects of their development. Year 1 of the survey provided data to describe the dietary profiles of Québec infants approximately 5 months of age. These profiles indicate the feeding method, introduction of complementary foods, and the use of certain vitamin and mineral supplements (Vitamin D, iron) in the diet of the infants. These variables were associated with certain characteristics of the baby, mother and household. Breast feeding is the recommended feeding method at the beginning of life, and ÉLDEQ constitutes the first large-scale survey that has provided data on its prevalence among Québec infants.





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